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Bibliography on Evaporation Measurement

August 1959 No. 8

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 10 AUGUST 1959 No. 8

SPECIAL FEATURE IN THIS ISSUE

Bibliography on Evaporation Measurement

By

Robert Panara

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically).

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution 2. Aerobiology 3. Cloud Physics 4. Hail
5. Tornadoes 6. Volcanic Dust 7. Climat. Changes 8. Thunderstorms
9. Icing 10. Acoust. Propagation 11. Evaporation

Vol. II, 1951

1. Extended Forecast. 2. Long Range Forecast. 3. Soil Temp. 4. Constants, etc.
5. Clim. of Near East 6. Clim. of Middle East 7. Special Winds 8. Radar Storm
9. Condensation Trails 10. Clim. of N. E. Africa 11. Mountain Met. Detect.

Vol. III, 1952

1. Clim. of N. W. Africa 2. Carbon Dioxide 3. Clim. of Argentina, etc. 4. Dew
5. Objective Forecast. 6. Stratus Forecast. 7. Urban Climatology 8. Clim. of C. Africa
9. Visibility 10. Glaze and Rime 11. Free Air Turbulence

Vol. IV, 1953

1. Turbulence Theory 2. Turbulent Diffusion 3. Frost 4. Clim. of Australia, etc.
5. High Level Winds 6. Winds in Stratosphere 7. Jet Stream 8. Radiation Bioclim.
9. Clim. of Pacific 10. Auroras 11. Sferics

Vol. V. 1954

1. Oceanog. Met. 2. Clim. of S. E. Asia 3. Auroral Physics 4. Tropopause
5. Balloons 6. Numerical Forecast. 7. Radiation Data 8. Vertical Motion
9. Clim. of Arctic 10. Industrial Met. 11. Wind Waves and Swell

Vol. VI, 1955

1. Bibliog. of Bibliog. 2. Texts & Monogr. Bibliogs. 3. Storm Surges
4. Ionospheric Prop. 5. Photochem.—Upper Atmos. 6. Cloud Physics
7. Radar Cloud Physics 8–9. Atmos. Nuclei 10. Weather Modification 11. Cooling Power

Vol. VII, 1956

1. Synoptic Met.-Arctic 2. Clim. of Enclosed Spaces 3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56) 5. Atmos. Radioactivity 6. Inversions
7. Snow Micromet. 8. Snow Micromet. (Suppl.) 9–11. Tropical Cyclones

Vol. VIII, 1957

1. Solar Weather Relations 2. Night Airglow 3. Forecasting Special Elements
4. Forest Micrometeorology 5. Hydromet. Forecasting 6. Numerical Forecast. (Suppl.)
7. Albedo 8. Meteors 9–10. Tropospheric Prop. 11. Medical Meteorology

Vol. IX, 1958

1. Radioastronomy 2. Solar Astrophysics 3. Radioactivity in Atmosphere
4. Waves and Currents 5. Physical Oceanog. 6. Dynamic & Phys. Oceanog.
7. Long Range Forecast. 8. Radar Met. 9. Cosmic Rays 10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
5–6. Ozone 7. Acoustic Waves 8. Evaporation Measurement

Other bibliographies in preparation are:

Actinometers — *High Atmosphere Temperatures* — *Singularities*
Evaporation — *Micrometeorology* — *Synoptic Aerology*
Frost — *Radiation* — *Thunderstorms*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

See also: **Numerical prediction texts.** (Bagrov, Morsko., *eds.*), 10.8–38.

10.8—1 551.5:92 551.5:016

†Akademiia Nauk SSSR [and] Geograficheskoe Obshchestvo SSSR, **Pamiati Iuliia Mihaĭlovicha Shokal'skogo: sbornik statei i materialov, chast' pervaia.** [Memorial to Iu. M. Shokal'skiĭ: papers and data on his life and scientific works, Vol. 1.] Ed. by I. Iu. Krachkovskiĭ. Moscow, Akademiia Nauk, **1946.** 373 p. ports., photos. Chronological list of his works, 1882–1940, with subject index p. 243–345. **DLC** (GC30.S48/A7) Vol. 2, ed. by A. K. Leonov, was pub. 1950.—The first 100 pages (p. 9–108) of this memorial volume (5000 copies) are devoted to a thorough biographical sketch of the life of the great Soviet geographer-oceanographer-meteorologist Iu. M. SHOKAL'SKIĬ by Z. Iu. SHOKAL'SKAIA (1856–1940), his daughter. The next 100 pages (p. 109–231) consist of a series of articles on his scientific activities in many fields: geography and oceanography (by B. P. ORLOV), The Black Sea Oceanographic Expeditions from 1923–1935; Hypsometry (P. I. SAVKEVICH), Cartography, Meteorology (I. TIKHOMIROV) (p. 190–196), history of geographic science, pedagogical activities and, finally, as a librarian of the Marine University for over 16 yrs. Over 100 pages (p. 233–346) are devoted to a chronological bibliography of >1300 of his works from 1882–1940, with a long sketch and analysis of his published works, including 65 general works (47 in Russian and 18 in foreign languages), 418 articles in periodicals, etc. (70 in foreign journals), 381 reviews, 83 articles in encyclopedias, 359 articles in newspapers, and 43 maps and atlases, making a grand total of 1349 articles and works cited. Analyzed by 5-yr periods, his most active period was 1901–05, when he published 238 items, 139 of which were reviews, but in 1936–40 he published 63 articles in scientific journals, compared with 52 in 1926–30 and 51 in 1901–05. The largest number of his works appeared in the **Izvestiia** of the Russian Geographical Society (123) and in the **Meteorologicheskiĭ Vestnik,** the forerunner of the present **Meteorologiia i Gidrologiia,** (124 items). Finally, several unedited works are reproduced (p. 347–373). An author, subject, and geographical index to his works is provided. SHOKAL'SKIĬ was active in teaching and writing up to a month or so of his death (March 26, 1940) from cardiac failure. He was born 5/17 Oct. 1856. The volume contains many fine illustrations of SHOKAL'SKIĬ at different periods and places, of his family and of activities connected with his life work. *Subject Headings:* **1. Biography of Iu. M. Shokal'skiĭ 2. Bibliography of Iu. M. Shokal'skiĭ 3. History of Soviet oceanography 4. History of Soviet meteorology 5. History of Russian Geographical Society. I. Krachkovskiĭ, I. Iu.** (*ed.*) **II. Shokal'skiĭ, Iu. M. III. Shokal'skaia, Z. Iu. V. Orlov, B. P. V. Tikhomirov, I.**—*M.R.*

10.8—2 550.4(08) 525.3 551.464

*†**Physics and Chemistry of the Earth, Vol. 2.** Ed. by L. H. Ahrens; Frank Press; Kalervo Rankama and S. K. Runcorn. N. Y., Pergamon Press, **1957.** 259 p. figs., tables, numerous bibliogs., eqs. Price: $10.00. **DWB** (551 P578), **DLC** (QC501.P53). Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser A,* 11(1):155–156, **1959.** Contents: von Arx, William S.: **Experimental approach to problems in physical oceanography,** p. 1–29. Ahrens, L. H.: **Survey of the quality of some of the principal abundance data of geochemistry,** p. 30–45. Urey, Harold C.: **Boundary conditions for theories of the origin of the solar system,** p. 46–76. Richards, Francis A.: **Some current aspect of chemical oceanography,**

p. 77–128. Hill, M. N.: **Recent geophysical exploration of the ocean floor,** p. 129–163. Shaw Denis M.: **The geochemistry of gallium, indium, thallium: a review,** p. 164–211. Melchior P. J.: **Latitude variation,** p. 212–243. These articles abstracted separately.—Each of the papers in this second volume on problems in physical oceanography and geophysics contains a survey of a particular branch of geochemistry or geophysics by an authority on the subject Considerable quantitative data in tables and graphs, and an extensive list of references, a de tailed subject index, and a name index are appended. (For abstract on Vol. 1, *see* 9.2–7 Feb. 1958, *MAB.*) *Subject Headings:* **1. Advances in oceanography 2. Geochemistry 3 Geophysics. I. Ahrens, L. H.** (*ed.*) **II. Press, Frank** (*ed.*) **III. Rankama, Kalervo** (*ed.*) **IV. Runcorn, S. K.** (*ed.*)—*M.R.*

10.8—3 551.556:551.461.2

Redfield, A. C. et al., **Interaction of sea and atmosphere: a group of contributions by A. C Redfield; A. R. Miller; G. W. Groves; D. L. Harris; R. O. Reid; W. Marks and J. Chase** Foreword by Charles C. Bates. *Meteorological Monographs* (pub. by American Meteorological Society), Boston, 2(10), June **1957.** 75 p. figs., tables, refs., eqs. **DWB, DLC.** Review in *Geofisica Pura e Applicata,* 39:238, **1958.**—The present monograph resulted from the work of the Committee on Interaction of the Sea and the Atmosphere under the joint sponsorship of the American Meteorological Society and the American Geophysical Union, formed in Dec. 1953 When the monograph was being compiled, C. C. Bates of the Hydrographic Office was Chairman of the Committee. A symposium was held in May 1954 and another in May 1955 on the problems considered in the 6 papers presented in this monograph: namely, the effect of wind storms, hurricanes, etc. on sea level and on wave spectra. (For listing of contents of this journal, *see* Pt. III, p. 478, March 1959, *MAB. Subject Headings:* **1. Ocean-atmosphere interaction 2. Wind effects on sea level 3. Storm tides 3. Wave spectra.**—*M.R.*

10.8—4 551.46(09)

National Institute of Oceanography, Wormley, Surrey, England, **Collected Reprints Vol. 5, Dec. 1957.** Reprints No. 163–209, each in original format with original paging. Of the nearly 50 papers (reprints) bound in this collection, nearly all have significance for the physical oceanographer, and have been abstracted separately. Some have appeared in meteorological journals in the United Kingdom and U. S. For listing of contents, *see* Pt. III, p. 1471 Nov. 1958, *MAB. Subject Heading:* **1. Physical oceanography research.**—*M.R.*

10.8—5 551.586:58(08

†United Nations Educational, Scientific and Cultural Organization, **Study of tropical vegetation: proceedings of the Kandy Symposium, jointly organized by the Government of Ceylon and UNESCO, Queen's Hotel, Kandy, Ceylon, March 19–21, 1956.** Issued Paris UNESCO, **1958.** 226 p. figs., tables, bibliog. at end of each ch. In French and English On half-title page: **Humid Tropics Research. DWB** (M86:580 U581st)—Thirty two papers presented in French or English on subjects relating to ecological factors in the Tropics, with emphasis on humid and on seasonal conditions, on vegetation types, climatic concepts, rejuvenation and mapping of vegetation types are included in this report. About 40 experts and delegates attended the 3-day Symposium on March 19–21, 1956. Thirteen recommendations of the Symposium include one on need for more meteorological data (temperature and humidity) in the Tropics, especially where not many stations exist. (For listing of contents of the Symposium, *see* Pt. III, p. 646, April 1959, *MAB.* These articles abstracted separately *Subject Headings:* **1. Tropical vegetation symposium 2. Tropical ecology 3. Kandy Symposium on Tropical Vegetation.**—*M.R.*

TEXTBOOKS

See also: **Climate, European Subarctic** (Grigor'ev), 10.8–53.

10.8—6 551.510.535(0

Massey, Harrie Stewart Wilson and Boyd, R. L. F., **The upper atmosphere.** London Hutchinson and Co., **1958.** 333 p. 12 figs., 21 plates, 6 tables, 20 refs., 33 eqs. Price: 63 s

DLC (QC879.M3). Review by D. R. Bates in *Nature*, 182(4650):1629, Dec. 13, **1958.**—This is the latest and most systematic book summarizing the current knowledge of the upper atmosphere (from 10 mi to several hundred mi above the surface) as gained by study of geomagnetic fields, radio wave propagation, spectra, radiations; by means of balloons, rockets, explosive waves, radio, spectroscopes, magnetometers, meteor photographs and spectra, cosmic ray counters or chambers, artificial satellites and other direct and indirect methods. Upper air temperature, composition, density; ionization, cosmic radiation (U V, visible, cosmic ray and radio frequency), magnetic fields and electric currents, auroral and air glow phenomena, ozone changes, twilight flashes and glows, atmospheric tides, solar corpuscular streams and other elements observed are tabulated. *Subject Headings:* **1. Upper atmosphere textbooks 2. Upper atmosphere physics.**—*M.R.*

10.8—7 551.5(02)

†Best, A. C., **Physics in meteorology.** N. Y., Pitman Pub. Corp., **1957.** 159 p. 26 figs., 13 tables, refs. at end of each ch., eqs. Price: $3.75. **DWB** (M:53 B561p), **DLC** (QC863.B45). Review by S. F. Singer in *Physics Today*, 10(9):36, Sept. 1957. Review in *Marine Observer*, London, 27(177):167–169, July **1957.** Review by Joost A. Businger in *American Meteorological Society, Bulletin*, 38(10):614, Dec. **1957.** Review by A. W. Brewer in *Meteorological Magazine*, London, 87(1028):59–60, Feb. **1958.**—A compact textbook for physics students, presenting in the several chapters the basic facts and theory regarding meteorological phenomena such as cloud and precipitation physics, radiation, atmospheric electricity, wind, optics, acoustics, radio meteorology and weather control. Ordinary and a few unusual meteorological instruments are reviewed in Ch I. The above subjects provide the headings for the subsequent 7 ch. Each chapter has a list of references appended, and a good subject index appears at the end of the book. A minimum of mathematics is incorporated in the text. The section of radio meteorology includes a thorough discussion of refractive index, its variation with height, ducts, anomalous propagation under varying meteorological conditions, sub-refraction, fog effects, attenuation by the atmosphere and by cloud and precipitation, etc. *Subject Headings:* **1. Physical meteorology textbooks 2. Radio meteorology 3. Meteorology textbooks.**—*M.R.*

10.8—8 551.511.3(02)

Laĭkhtman, David L'vovich (*ed.*), **Zadachnik po dinamicheskoĭ meteorologii.** [Exercises in dynamic meteorology.] Leningrad, Gidromet-izdat, **1957.** 180 p. tables, eqs. **DWB** (M L185za) Also: **[Review of] L. S. Gandin; D. L. Laĭkhtman; E. A. Sopots'ko and M. V. Shlaneva: Zadachnik po dinamicheskoĭ meteorologii.** *Meteorologiia i Gidrologiia*, Leningrad, 1:62–63, Feb. **1959. DWB, DLC**—A workbook consisting of numerous problems, to be solved by students of meteorology in the hydrometeorological institutes, to accompany a standard course in dynamic meteorology. The problems are accompanied by brief textual material on the following subjects: I) Basic nature of meteorological fields, II) Thermodynamic processes in dry air, III) Thermodynamic processes in moist air, IV) Radiation, V) Statics, VI) Wind in the free air, VII) Discontinuities and waves, VIII) Nonperiodic changes of pressure and temperature, IX) Ground layer, X) Boundary layer, XI) Energetics and circulation theory. Both practical and theoretical problems are included. Useful graphs, nomograms and tables are also included. (*See* 8.7–9 for text by same authors.) *Subject Headings:* **1. Exercises in dynamic meteorology 2. Dynamic meteorology workbooks 3. Textbooks. I. Gandin, L. S. II. Sopots'ko, E. A. III. Shlaneva, M. V.**—*M.R.*

10.8—9 551.579(02):62

†Linsley, Ray K., Jr.; Kohler, Max A. and Paulhus, Joseph L. H., **Hydrology for engineers.** N. Y., McGraw-Hill, **1958.** 340 p. numerous figs., tables and foot-refs. **DWB** (M79 L759hy)—The 1949 textbook written by the same authors (**Applied hydrology,** *see* 3–113, March 1950, *MAB*) was much larger and more technical than this newly written text which is intended as an elementary text for engineering students, with a minimum of theory and a maximum amount of quantitative illustrative material in tables and graphs. The general outline, however, is similar to that of the 1949 text: 1) Hydrologic cycle, etc., 2) Weather, 3) Precipitation, 4) Stream flow, 5) Evaporation, 6) Ground water, 7) Hydrographs, 8) Runoff, 9) Runoff

hydrographs, 10) Stream flow routing, 11) Duration frequency analysis, 12) Sedimentation, 13) Hydrologic applications; also two appendices covering: A—Graphical correlation and B—Constants, tables, etc. Finally, there is a good name and subject index. *Subject Headings:* **1. Hydrology textbooks 2. Engineering hydrology.**—*M.R.*

10.8—10 551.46(02)(09)(261)

†Stommel, Henry (*Woods Hole Oceanog. Institution*), **The Gulf Stream: a physical and dynamical description.** Berkeley, Univ. of California Press, **1958.** 202 p. 80 figs., 7 tables, bibliog. p. 186–197., eqs. Price: $6.00. **DLC** (GC296G.9S7)—A readable, yet technical and condensed review, in textbook form, of all of the knowledge from the earliest times, of the Gulf Stream from an oceanographer's point of view. The recorded history of its discovery, measurement and theories regarding its cause, equipment and instruments used in measurement, the geostrophic forces and the density and pressure fields, large scale circulation of North Atlantic hydrographic sections and transfer of masses, wind systems and synoptic situations causing them, linear theories, viscous theory, wind-driven theory of MUNK, nonlinear or inertial theories, meanders, fluctuations: thermohaline circulation; and, finally, general ideas of climate, value of expeditions and research in the theoretical-empirical field (as opposed to pure theory or pure hydrographic surveys) are reviewed. A good bibliography and index are provided. *Subject Headings:* **1. Gulf Stream textbooks 2. Oceanography textbooks 3. History of oceanography 4. Gulf Stream 5. North Atlantic.**—*M.R.*

10.8—11 551.586:615.838(02)

†Haeberlin, Carl and Goeters, W., **Grundlagen der Meeresheilkunde.** [Fundamentals of marine resort medicine.] Stuttgart, G. Thieme, **1954.** 264 p. 21 figs., bibliog. p. 188–251. Meteorological introd. by W. Leistner and clinical report by E. Kruger and (Dr.) Zürcher. **DWB** (615.853 H133gr), Review in *Meteorologische Rundschau*, Berlin, 11(1):40, Jan./Feb. **1958.**—A most thorough and well-edited text on the various aspects of sea resort therapy, starting in Pt. I with the meteorological aspects (p. 1–44); going on in Pt. II with the medicinal aspects (p. 45–185), including the history, physiological effects of marine climate, particular effects on asthma, skin diseases, metabolism, cardiac and circulatory system, blood, nervous system, tuberculosis, female disorders, rheumatics, etc.; and, finally, in Pt. III giving a perspective of the different characteristics of various resort places on the North Sea and Baltic. An extremely thorough bibliography and detailed subject index is appended. *Subject Headings:* **1. Thallasotherapy textbooks 2. Balneology bibliographies 3. Climatotherapy.**—*M.R.*

10.8—12 53:519.2(02)

Iakovlev, Konstantin Pavlovich, **Matematicheskaia obrabotka rezul'tatov izmerenii** [Mathematical treatment of the results of measurements.] Corrected 2d ed. Moscow, Gosud. Izdvo Tekhniko-Teoreticheskoĭ Literatury, **1953.** 383 p. 38 tables, 62 figs., numerous eqs. **DLC** (QC39.12 1953)—A textbook for physicists, engineers and physical chemists, giving examples, as well as methodology, of complication of experimental data from physical measurements. The significance of figures and their accuracy, approximations in arithmetical data and in formulas, normal distributions, absolute and probable error and tests of significance, examples of graphical analysis, nomograms of several types, interpolation, harmonic analysis and empirical formulas are the subjects of the 10 main chapters. *Subject Headings:* **1. Statistical methods in physics 2. Nomograms 3. Significance tests.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **WMO Comm. for Aerology reports,** 10.8–50; **Cold injury studies, Antarctica** (Sapin-Jaloustre), 10.8–58; **Earth satellite data, 1958 Epsilon,** 10.8–91; **Geomag. and Z-component** (Köhler), 10.8–109.

10.8—13 551.571:551.501

Tunnell, G. A., **World distribution of atmospheric water vapour pressure.** *Great Britain Meteorological Office, Geophysical Memoirs*, No. 100, **1958.** 61 p. table, 2 refs. almost entirely maps. **DWB, DLC**—Continuing the unique series of monographs devoted to world distributi

of upper air, wind and temperature, a compilation of the essential data on mean vapor pressure at sea level for the 4 seasons (Jan. April, July and Oct.) is presented in the form of charts, covering separate regions: Europe, Asia, South Asia monsoon region, Africa, North America, South America, Australia, Arctic and Antarctic, with some overlap. In Pt. II the diurnal variation of vapor pressure and its association with the major climatic types is discussed and maximum and minimum values for each season, with corresponding hours of the day, given in a table of 65 selected stations distributed evenly around the world and in all latitudes. *Subject Headings:* **1. World vapor pressure units 2. Vapor pressure charts 3. World.**—*M.R.*

10.8—14 551.506.1(058)(410)(411)(415)(420):550.38(058)

*The Observatories' Year Book, 1939. **Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the Lerwick, Aberdeen, Eskdalemuir, Valentia, and Kew Observatories, and the results of soundings of the upper atmosphere by means of registering balloons.** London, **1956.** 200 p. And issues for 1940, pub. **1958;** 1941, pub. **1958;** 1943, pub. **1958;** 1944, pub. **1959.** paging varies. Each yearbook about £3. All almost entirely tables. The **Year Book** was published 1922–1937 in continuation of Pt. 3, Section 2 and Pt. 4 of the **British Meteorological and Magnetic Yearbook,** 1908–1921. **Year Book** was suspended 1939–1945. It is now published in an abridged form. **DLC**—The 1939 **Year Book** gives daily, monthly, and annual values of atmospheric potential gradient, terrestrial magnetism, and auroral data for Lerwick, Eskdalemuir, and Kew Observatories; meteorological (pressure, temperature, humidity, precipitation, sunshine, wind, ground temperature, gross minimum temperature) data for Aberdeen, Eskdalemuir, Valentia and Kew Observatories; and upper air geopotential, temperature and relative humidity for standard isobaric surfaces (1000–100 mb) and heights and lapse rates between given heights (to 25 km), plus data on tropopause type, height, pressure and temperature, and on weather and pressure conditions. Included are data from 44 balloon meteorograph soundings at Kew and 26 from Scotland (53°14′N; 3°00′W). Ample notes are included with tables. The other Year Books follow a similar arrangement. (For abstract on 1938 **Yearbook,** issued 1955, *see* 9–79, Sept. 1956, *MAB.*) *Subject Headings:* **1. Annual meteorological data summaries 2. Observational data 3. Geomagnetic yearbooks 4. Atmospheric electricity data 5. Solar radiation data 6. Upper air data 7. Kew Observatory, Eng. 8. British Isles.**—*M.R.*

10.8—15 551.584:551.579(798)

*†Mather, John R. and Thornthwaite, Charles W., **Microclimatic investigations at Point Barrow, Alaska, 1957–1958.** *Drexel Institute of Technology. Lab. of Climatology, Publications in Climatology,* 11(2), **1958.** 239 p. 6 figs., 48 refs., numerous tables. **DWB** (M8 D777p)—Continuous field observations of the heat and moisture balance made from June 1957 through Aug. 1958 at Point Barrow, Alaska, are analyzed and summarized in this monograph. Preliminary testing of equipment during the summer of 1956 was discussed in a previous report (10.3–20, March 1959, *MAB*). Instrumentation, site, general weather conditions, observational program, and an analysis of the observations with respect to: a) heat and moisture budgets; b) daily heat balance; c) precipitation and d) evapotranspiration are covered in text and illustrated by charts, tables, graphs, profiles, etc. About 140 pages of appended tabular data give the actual 24-hourly observations on days when completed series of observations were made, thrice daily observations on other days during the period, and the heat budget computations. Elements covered include soil, heat flux, solar radiation, net radiation, vapor pressure, wind direction and speed, and air and soil temperature. *Subject Headings:* **1. Microclimatic research programs 2. Evapotranspiration in Arctic 3. Heat and moisture budget Point Barrow, Alaska. I. Arctic Institute of North America.**—*M.R.*

10.8—16 551.577(814)

*São Paulo (State), Brazil. Depta. de Águas e Energia Electrica, **Boletim Pluviométrico** [Precipitation Bulletin], Ser. 2, Vol. 1, 1941–1952. Issued São Paulo, **1958.** 626 p. map (colored, fold.). Almost entirely tables. "First volume of the new series. Old series, published by Instituto Geográfico e Geológico, not published after 1942. Forthcoming Vol. 2 will cover 1953–1957." (PAU?)—A huge volume of precipitation data obtained from nearly 200 stations in São Paulo, Brazil, since 1941. Data are arranged by years and by stations in each

of 8 zones, giving monthly mean precipitation, greatest in 24 hrs and number of days with precipitation. A beautiful and brightly colored folded isohyetal map is included for each year from 1941–1952 and a mean map for 1941–52. Means for each of the 8 zones are compared for each year with departures from normal shown in color on histograms. Daily rainfall is given for 27 stations for each year 1942–1952. *Subject Headings:* **1. Precipitation data, São Paulo, Brazil 2. Isohyetal charts 3. São Paulo (State), Brazil.**—*M.R.*

10.8—17 551.506.1(46)

*Spain. Servicio Meteorológico Nacional, **Resúmen de observaciones meteorológicas efectuadas en las estaciones de I, II, y III orden.** [Résumé of meteorological observations from first, second and third order stations], 1949. Pub. Madrid, **1957.** 463+1510 p. Almost entirely tables. **DLC**(QC989.S75A26)—A huge compilation of data from the entire network in Spain for the year 1949. The first 70 pages comprise an index of the 2786 stations, their coordinates and the pages on which data are found. Next there are about 400 pages devoted to a detailed description of all the stations, their sites, surroundings and names of observers. Then 1250 pages devoted to tables of monthly mean and frequency data for all stations of I, II and III order and, finally, 250 pages of summaries of monthly and annual means of each element, with stations arranged by province and alphabetically within each province. Folded charts of each major area show location of stations within that area. Besides the usual elements there are data on evaporation, visibility, vapor pressure, and special elements. Complete data are given for 109 stations, temperature and precipitation for 561 stations and rainfall for 2116 stations. *Subject Headings:* **1. Annual meteorological data summaries 2. Station description catalogs 3. Spain.**—*M.R.*

10.8—18 551.509.616:551.574.1(263,282.272.7)

Braham, Roscoe R., Jr.; Battan, Louis J. and Byers, Horace R. (*all Chicago Univ.*) **Artificial nucleation of cumulus clouds.** *Meteorological Monographs*, (American Meteorological Society), Boston, 2(11):47–85, July **1957.** 23 figs., 17 tables, 68 refs., 2 eqs. **DWB, DLC**—A thorough and well-illustrated (with photos and graphs, charts, etc.) monographic article summarizing the work done during 1951–54 by the University of Chicago Cloud Physics Project in the laboratory and the Caribbean, and the Central Mississippi Basin. The history of the Project, instrumentation, design of program (physical and experimental), location of flight sectors, seeding elements and their treatment, analysis of data (shown by scatter diagrams and histograms as well as contingency tables) for both test areas and for treated and untreated clouds, laboratory work on particle size and origin, coalescence, capture, etc. and, finally, conclusions. Among these are the followings: 1) Importance of ice-crystal or water condensation and coalescence processes differs in the 2 areas; 2) Over the Caribbean the all-water process is the dominant or exclusive one; 3) Over the continent both processes pertain; 4) Large valve water spray treatment was often successful. *Subject Headings:* **1. Cloud Physics Project 2. Warm cloud seeding 3. Water spray seeding 4. Cloud seeding evaluation 5. Caribbean 6. Central Mississippi Valley.**—*M.R.*

10.8—19 551.584.42:533.16(78

*Barad, Morton L. (*ed.*), **Project Prairie Grass, a field program in diffusion.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 59, July **1958.** Vol. 1– (Vol. 1, 280 p.; Vol. 2, 209 p.) figs., photos, numerous tables. "Vol. 3 to be published by Sept. 1959." **DLC**—Project Prairie Grass was conducted during July and Aug. 1956, near O'Neill, in north central Nebraska, on a square mile section of flat land covered with grass, to determine the rate of diffusion of a tracer gas (SO_2) under different meteorological conditions. Equipment and techniques used in dispersing, sampling and analyzing the gas, in measuring the meteorological elements, and in reduction of data, are described and illustrated. Surface upper air and synoptic data are presented in tables and charts in Vol. I; Vol. II contains description of instruments for measuring air and soil temperature, wind speed profiles, and tables of actual profile data, heat budget calculations, optical method of determining temperature profiles, radiosonde data to 600 mb level and airplane observation data up to 7000 ft for each test. Vol. III will present a description of the bi-vane anemometry used in measuring eddy components and turbulence spectra, sonic anemometry determinations of turbulence spectra

During the Project 70 experimental releases were conducted for 10 min each from a continuous ground level point source and data obtained over a range of 800 m. Tables include data on albedo, soil moisture, heat capacity, ten minute average gas concentrations measured in horizontal and vertical planes, and micrometeorological data. Albedo ranged from .331 at 6h to .184 at 12 and 13 h, as an average. *Subject Headings:* **1. Project Prairie Grass 2. Diffusion of tracer gases 3. Micrometeorological field programs 4. O'Neill, Nebr.**—*M. R.*

10.8—20 551.510.42(764)

*†Paganini, Otto (*Texas State Dept. of Health*); High, Marvin D. and Kenline, Paul A. (*both, U. S. Public Health Service*), **Appraisal of air pollution in Texas; report of a cooperative survey by the Texas State Department of Health and the U. S. Department of Health, Education, and Welfare, Public Health Service, December 1957 through July 1958.** Austin, Texas, 1958. 107 p. 17 figs., 41 tables, 60 refs.—A survey of climate, topography, population growth, and air pollution problems in Texas, conducted from Dec. 1957 through July 1958, is reported, with recommendations. Of 71 larger cities in Texas, 56 had air pollution problems, and 194 out of 410 smaller towns polled indicated that they had objectionable air pollution. Climatological data includes seasonal wind rose, temperature and precipitation charts, and tables of data (by regions) on wind, precipitation, fog, cloud, precipitation, sunshine and relative humidity. Data on dust and particulate matter, gases, evaporation, dust storms and wind speed are included in discussion of weather and climate. *Subject Headings:* **1. Atmospheric pollution surveys 2. Texas. I. Texas. State Dept. of Health II. U. S. Public Health Service.**—*M. R.*

10.8—21 551.510.53:551.510.3:551.557 551.524.7:551.557.2

*†Wege, K.; Leese, H.; Groening, H. U. and Hoffmann, G., **Mean seasonal conditions of the atmosphere at altitudes of 20 to 30 km and cross sections along selected meridians in the Northern Hemisphere.** *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 6(4), 1958. 101 p. 2 tables, 46 refs., 4 eqs., numerous charts and graphs. **DWB** Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 11(1):154–155, 1959.—The mean seasonal temperature, absolute topography, relative topography, geostrophic wind and density distribution over the Northern Hemisphere, except for Central and Southern Asia, are shown on sharts for the 30, 20 and 15 mb surfaces, and density for 200, 100 and 50 mb, based on data for 1955 -57. Network, period of observations, methods of computing means, and analysis techniques are discussed, and then the pressure, wind and temperature fields as shown on the charts are discussed for each respective season (spring, summer, fall and winter) and, finally, 0–30 km cross sections of temperature and humidity and pressure-height conditions are discussed also. An article by H. FORTAK discusses intrusion of high stratospheric warming into lower layers by turbulent heat conduction, with curves showing Berlin warming in Feb. 1952 and Jan./Feb. 1957. *Subject Headings:* **1. Northern Hemisphere mean stratospheric charts 2. Stratospheric densities 3. Stratospheric warming, Feb. 1952 4. Stratospheric warming, Jan.–Feb. 1957 5. Northern Hemisphere.**—*M. R.*

10.8—22 551.583.7:551.1

*Ma, Ting-Ying H., **Research on the past climate and continental drift, Vol. 5, The shiftings in pole-positions with diastrophisms since the end of the Cretaceous, and the accompanying drift of continents.** Pub. by the author, Taipeh, Taiwan, China, May 1952. 176 p. 6 figs., chart, 22 plates, tables, bibliog. p. 153–173. **DLC** (QC884.M25)—The paleogeographic, zoologic, paleobotanic, submarine canyon, oceanographic, orogenetic and climatic evidence for the sudden shifts of the North Pole from 45°S, 40°E in the Cretaceous to 30°S, 25°E in the Laramie to 18°S, 20°E at the end of the Liaoning stage, 5°S, 35°E at the end of the Fushun stage, to 15°N, 60°E at the end of the Bessyo stage, to 32°N, 45°E at the end of the Boodain stage to 52°N, 30°E at the end of the Tertiary, 72°N, 15°E at the end of the Chukut stage and to the present position after the Tateyama stage, are presented in great detail for each continent and for the oceans, with maps and charts to illustrate. All glaciations, climatic changes and forms of life are explained on the basis of polar migration, continental drift and sea level changes. A great amount of literature is cited in the text and extensive bibliography. (For abstract on

Vol. 4, *see* 10.6–290, June 1959, *MAB.*) *Subject Headings:* **1. Paleoclimatology 2. Continental drift 3. Polar displacement 4. Submarine canyons.**—*M.R.*

10.8—23 551.579 551.481.1(285)

*Ayers, J. C. (*Cornell Univ.*); Anderson, D. V. (*Ontario Dept. of Lands & Forests*); Changler, D. C. and Lauff, G. H. (*both, Mich. U.*), **Currents and water masses of Lake Huron: 1954 synoptic surveys.** *Ontario. Dept. of Lands and Forests. Div. of Research, Research Report,* No. 35; Feb. **1956.** 101 p. 48 figs., 13 tables, plus numerous tables in appendix, 7 refs. (Also on cover: *Michigan. Univ. Great Lakes Research Institute, Ann Arbor, Technical Paper,* No. 1. **DWB** (M79 A977cu)—During the summer of 1954, three synoptic surveys, involving more than 80 stations each, were made on June 28 and 29, July 27 and Aug. 25. Elements recorded were temp., magnesium, silicon, calcium, conductivity (horizontal and vertical), horizontal transparency, relative humidity and drift currents at surface and bottom. Equipment, results of analyses, as well as the raw data and analyzed data, are presented in text and in tables, charts, graphs, etc., respectively. Water masses from Lake Michigan and Lake Superior, as well as from Lake Huron, are identified at the surface and along the bottom, where possible. The cooperative international project involved 5 Canadian and 6 U. S. vessels. *Subject Headings:* **1. Limnological surveys 2. Lake Huron.**—*M.R.*

10.8—24 551.521.11(714,719) 551.521.14(714,719)

*Jackson, Charles Ian, **Insolation and albedo in Quebec-Labrador.** *McGill Univ. McGill Sub-Arctic Research Lab., McGill Sub-Arctic Research Papers,* No. 5, Dec. **1958.** 105 p. 39 figs., tables, 17 refs., eqs.—Data on total insolation, albedo and cloud cover, obtained by field studies centered at the McGill Subarctic Research Laboratory at Knob Lake, Quebec, are analyzed and charted, and the techniques used are described. The first part deals with the charting of mean insolation in Labrador-Ungava, the second part with the mapping of albedo of different cover-types by solarimetric measurements from helicopters during summer of 1957. In Pt. III the albedo data are integrated over southern Labrador and Quebec to give an indirect estimate of the total insolation absorbed. The only regular actinometer stations in or near this area are Goose Bay, Labrador, Moncton, New Brunswick and St. Johns, Newfoundland. The present group made actinograph measurements at Knob Lake starting in May 1957. Four stations record sunshine. To supplement this meager data, monthly mean cloud maps were constructed and are shown for 10 yrs (Jan. 1944–Dec. 1953). using data for 18 stations (listed with coordinates and shown on a map). In Sept. and Oct. mean cloudiness reaches >85% in Central Labrador (Indian Horse Lake), and >80% over most of the peninsula, whereas in Jan. and Feb. the highest values are about 55–60%. A scatter diagram shows relation of sunshine to mean cloud amount at Knob Lake, with a regression equation for each month. Duration of continuous snow cover is also considered and shown on charts (1941–50). Albedo of 9 types of cover is given and mapped; lichen woodland, close-crown forest, bog and muskeg, bare rock and lichen, burned areas, open water, and snow cover on 3 of these types or combinations of types. Albedo ranges from 8% for bare rock and lichen to 80% for the last 3 types covered with snow. Charts of absorbed solar radiation during snow-free and snow-cover season are also given. *Subject Headings:* **1. Insolation, Quebec-Labrador 2. Albedo, Quebec-Labrador 3. Cloud cover, Quebec-Labrador 4. Albedo of cover types 5. Quebec-Labrador 6. Knob Lake, Quebec.**—*M.R.*

10.8—25 551.582.1(47)

§*†Lebedev, A. N., **Evropeĭskaia territoriia SSSR.** [European U.S.S.R.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Klimat SSSR,* Vol. 1, **1958.** 366 p. 82 figs., 65 tables, 247 refs. **DLC** (QC989.R39L46 Slav Rm)—This 1600 copy edition is the first of the new 7 volume series of climatic handbooks of the various regions of the U.S.S.R. (an earlier series was issued in the 1920's and a more analytical series in the 1930's and 1940's). The other parts cover: 2) Caucasus; 3) Central Asia; 4) West Siberia; 5) East Siberia; 6) Far East including Kamchatka and Sakhalin and 7) Arctic U.S.S.R. The work contains average and frequency data for different places, seasons and years, and combined frequencies of elements; charts, maps and graphs showing time and space distribution of elements; and sample synoptic charts for specified situations. The general organization of the book follows the standard pattern used

the **Climatology of the Far East** (10.8–26) and other Volumes. Pt. I consists of the climatic processes: Radiation (direct solar, indirect total, albedo, absorption, effective balance), circulation (zonal westerlies, easterlies and local meridional). Pt. II, General characteristics of climate: thermal regime (including frost and soil temperature), moisture regime (humidity, clouds, precipitation, duration of precipitation, snow cover, evaporation); wind and wind energy; fog, blizzards, thunder, glaze, drought and hot dry winds; local peculiarities of climate, Pt. III covers seasonal characteristics of climate in the 8 "natural regions": 1) far north, 2) forest zone, 3) central, 4) southern region, 5) Urals, 6) North Caucasus, 7) Crimea, 8) Carpathians, and 9) general character. An excellent bibliography of nearly 250 references to Russian literature, with some as recent as 1958, is appended. *Subject Headings:* **1. Climate of European U.S.S.R. 2. Climatic handbooks for U.S.S.R. 3. European U.S.S.R.**—*M.R.*

10.8—26 551.582.1(573)

*†Zanina, A. A., **Dal'nevostochnye raĭony: Kamchatka i Sakhalin.** [Far Eastern regions: Kamchatka and Sakhalin.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Klimat SSSR*, Vol. 6, **1958.** 166 p. 57 figs., 29 tables, 47 refs.—This is another of the new series of climatological studies of various regions of the U.S.S.R. The present study is not as voluminous as the one on the European U.S.S.R. by LEBEDEV (Vol. 1), but probably comparable to that on the Caucasus (Vol. 2), Central Asia (Vol. 3), Western Siberia (Vol. 4) or Eastern Siberia (Vol. 5), all of which should appear in the 1958–59 period. Not all of the detailed climatic data available is included, but selected data are presented in well-organized, statistical tables and complex diagrams or isarithm charts. Pt. I covers the factors affecting the climate: 1) radiation (direct, total, absorption, effective and balance); 2) general circulation in different seasons; 3) role of relief and seas, lakes, water, snow, etc. Pt. II gives a perspective of the seasonal regimes of temperature, wind, moisture, fog, blizzards, thunderstorms, frost and glaze. Pt. III goes into the seasonal characteristics of the climate of the several natural regions: Chukot-Anadyr, Okhotsk, lower or eastern Amur, middle or western Amur, Maritime, Kamchatka and Komandorskie Islands, and Sakhalin and the Kuriles. A good list of references is appended. *Subject Headings:* **1. Climate of the Asiatic Far Eastern U.S.S.R. 2. Far East Asiatic U.S.S.R. 3. Kamchatka 4. Kuriles 5. Amur Region, U.S.S.R. 6. Sakhalin.** —*M.R.*

POPULAR METEOROLOGY

See also: **IGY program** (Marshack), 10.8–44; **Trans-Antarctic Exped.**, 1957–58 (Barber), 10.8–61; **Climate, Italy** (Kish), 10.8–324.

10.8—27 551.5(023)

Adler, Irving, **Weather in your life.** Illustrated by Peggy and Ruth Adler. New York, J. Day Company, **1959.** 126 p. figs., photos. **DLC** (AC863.A24)—A popular (juvenile) illustrated account, in textbook style, of weather in everyday life, causes and peculiarities of wind, rain, air masses, forecasting, and climatic changes. The many schematic diagrams help to depict the processes, both basic and special, of the atmosphere. *Subject Headings:* **1. Popular meteorology textbooks 2. Juvenile meteorology books.**—*M.R.*

10.8—28 551.58:63

Smith, L. P. (*Agric. Branch of the Brit. Met. Off.*), **Farming weather.** London, Thomas Nelson and Sons Ltd., **1958.** 208 p. 35 figs., tables, 8 plates. **DLC** (QC863.S65). Review in *Royal Met. Society, Quarterly Journal*, 84(362):479, Oct. **1958.** Review in *Weather*, 13(9): 317, Sept. **1958.**—In this unique book, a qualified meteorologist with ten years of experience in the agricultural meteorology service (of the British Met. Office), gives the farmer or layman a good perspective of the usefulness of a knowledge of weather, climate and forecasts for farm planning and everyday operations, especially in the British Isles. Pt. I contains 12 chapters on weather and agriculture: sun and light, wind and rain, temperature and humidity, fog and frost, soil temperature and soil moisture, evaporation and transpiration, moisture control, shelter, pests and diseases, and major disasters. Pt. II, on climate and agriculture, has 7 chapters on temperature climate, humidity climate, sunshine climate, rainfall climate, wind, gales, frost and snow and climatic variations. Pt. III on agrometeorological forecasts has 5

chapters on need of forecasts, language of forecasts, forecast service, self help and weather lore and fallacies. Numerous original graphs, isothermal maps, tables and cloud photos add to the value of the text. *Subject Headings:* **1. Agricultural meteorology 2. Agricultural climatology 3. Farming weather 4. Great Britain.**—*M.R.*

10.8—29 551.509.2/3(02)

§†Taylor, James Allan and Yates, Robert Arthur (*both, Univ. College of Wales, Aberystwyth*), **British weather in maps.** London, Macmillan, **1958.** 256 p. 81 figs., bibliog. p. 250–251. **DLC** (QC989.G69T3)—This new text treats of the traditional aspects of meteorology from an unusual point-of-view, that of the daily synoptic weather map of the British Isles. Each paragraph is illustrated by some typical or unusual synoptic chart or sounding: lapse rates, inversions, air masses (8 types), fronts (7 types), anticyclones (4 types), secondaries, troughs, wedges, cols, etc. In addition, the British Daily Weather Map and Report is explained and illustrated in detail. *Subject Headings:* **1. Synoptic meteorology textbooks 2. Synoptic case histories of Britain 3. Great Britain.**—*M.R.*

10.8—30 551.521.1:620.9(023)

Halacy, D. S., Jr., **Fabulous fireball: the story of solar energy.** New York, Macmillan Company, **1957.** 154 p. numerous photos. **DLC** (TJ810.H3)—A well illustrated popular, but thorough, book for children on the various types of solar furnaces and methods of utilizing solar energy. Solar houses, collectors, cookers, stills, batteries, air conditioners, space ships are described and illustrated in separate chapters. *Subject Headings:* **1. Solar energy utilization 2. Solar furnaces 3. Juvenile meteorology books.**—*M.R.*

10.8—31 629.13(09)

Schieldrop, Edgar B. (*Oslo Univ., Norway*), **The air.** Foreword by the Lord Brabazon of Tara. (Rev. and enl. ed.) N. Y., Philosophical Library, **1958.** 256 p. figs., photos, tables. Price: $12.00. **DLC** (TL515.S38 1957). First ed. pub. **1940.** 327 p.—A fascinating, illustrated book on the development of aircraft of all types from the first successful balloons (June 4, 1783) to jets and rockets. One of the five chapters deals with air routes, their development and aids to navigation. The last chapter gives an insight into the future of air or space navigation. The preface (reprinted from the first edition of 1940), appears quite prophetic today. The recent developments to 1956 in supersonic flight and passenger jet planes, including the Comet II, III and IV A (550 mph), are included in this edition, but not the American jet transport planes. *Subject Headings:* **1. History of aeronautics 2. Rocket development 3. Air navigation.**—*M.R.*

10.8—32 551.5:087.5(023)

Ruzic, Neil P., **There's adventure in meteorology.** Chicago, Popular Mechanics Press, **1958.** Illustrated by Frank C. Murphy. 166 p. **DWB** (M R 987th)—A fictional story of adventure in the Caribbean with much practical meteorological knowledge interwoven with the "Robinson Crusoe" type of plot. Several preliminary chapters are devoted to such dramatic phenomena or activities as tornadoes, weather reconnaissance, weather control, hurricane research, upper atmosphere soundings by balloons and rockets, frost prevention, cosmic rays, etc. The main part of the book revolves around an airplane accident on a tropical island during a flight through hurricane "Carol" in a plane on which two boys were stowaways. In addition to survival measures, the boys constructed a number of meteorological instruments such as a psychrometer, instrument shelter, recording hair hygrometer, barometer, thermometer, wind vane, anemometer, nephoscope, etc. to aid in survival and eventual return to civilization. *Subject Headings:* **1. Juvenile meteorology books 2. Hurricane reconnaissance 3. Amateur weather instrument construction.**—*M.R.*

MANUALS, ATLASES AND HANDBOOKS

10.8—33 551.501.1(02)

Chile. Oficina Meteorológica, **Manual para observadores meteorológicos.** [Manual for meteorological observers.] June **1958.** 148 p. figs., tables (forms) throughout. **DWB**

(M01.1 C537 ma)—This manual is intended as a text of instruction or reference for weather observers. It contains detailed instructions (with illustrations of instruments, forms and symbols) for observing clouds, ceiling, visibility, state of the weather, precipitation amount, temperature, humidity, pressure and wind and for reporting these observations. A chapter on marine weather observations is included. *Subject Headings:* **1. Observers manuals.**—*G.T.*

10.8—34 551.501.4:551.508.26:551.526(02)

Richmond, Benjamin S., **Processing bathythermograph data at the Hydrographic Office.** *U. S. Hydrographic Office, Technical Reports,* TR-37, **1956.** 19 p. 9 figs., 11 refs. **DLC** (GC177.R5)—The system of processing bathythermograph data, used at the Hydrographic Office of the U. S. Navy since 1955, enables the data from numerous vessels to be processed (collected, analyzed and compiled) at one central location. All bathythermograph slides and logs are put on 35 mm film to use in automatic transcription on punch cards. This manual outlines and illustrates details of processing at the Hydrographic Office since 1941, but especially the new system: 1) receipt and logging of observations; 2) checking and coding log sheets and slides; 3) photographing slides and log sheets; 4) editing and screening the film; 5) processing prints; 6) production capacity of equipment; 7) costs and, finally, future plans for revision of log sheets and manuals for film storage and for electronic scanning of traces. *Subject Headings:* **1. Bathythermograph processing manuals 2. Ocean temperature data.**—*M.R.*

10.8—35 551.579:551.573:912(7)

Thornthwaite, C. W.; Mather, John R. and Carter, Douglas B., **Three water balance maps of eastern North America.** Foreword by Edward A. Ackerman, Wash., D. C., Resources for the Future, Inc., Nov. **1958.** 47 p. 4 figs., 4 tables, 39 refs. 3 maps (colored, fold. in pocket) **DWB**—The 3 beautifully colored water balance maps: 1) Mean annual water surplus, 2) Mean annual water deficit and 3) Potential evapotranspiration, cover the U. S. and Canada east of the 95th meridian (approximately the Mississippi Basin) and South of James Bay (55°N). The text discusses the history of climatic or precipitation maps, the measurement of evapotranspiration; computing the water balance at a given station, computation of the 3 maps; areal differences in Eastern North America, yearly fluctuations in water balance; differences obtained by different methods of computation, use of the 3 maps, reliability of computed water surplus as a measure of runoff, and future lines of study. Appendix gives monthly values of the elements of the water balance at 50 selected stations in eastern North America. Illustrative graphs and curves, and a selective bibliography, are also included. *Subject Headings:* **1. Water balance charts 2. Potential evapotranspiration charts 3. Potential evapotranspiration data 4. Eastern North America.**—*M.R.*

10.8—36 551.509.31(02)

Uchebnyĭ sinopticheskiĭ atlas, chast' 1. [Students' synoptic atlas, Pt. 1], ed. by Kh. P. Pogosian. Leningrad, Gidrometeoizdat **1956.** 96 charts (various sizes up to 88 × 66 cm). Also **Zadaniia dlia studentov k "Uchebnomu sinopticheskomu atlasu," chast'1,** [Assignments to accompany the Atlas]. 114 p. figs. pub. **1956.** Ed. by A. S. Zverev. both, **DWB** (M(07) U17uc)—The altas (and accompanying manual) contains material for 6 major assignments in a course on synoptic analysis: 1) 16 charts for general knowledge of surface and upper air charts, location of stations, plotting, etc.; 2) 7 charts for analysis of baric and wind fields; 3) 21 charts for location and identification of air masses and fronts; 4) 11 charts for studying development and characteristics of young cyclones (cyclogenesis); 5) 20 charts for studying the life history of cyclones and 6) 20 charts on origin and development of anticyclones. Extensive tables of surface and upper air (radiosonde and aerometeorograph) data for periods corresponding to charts are included. The series of 96 charts comprise surface, 850, 700, 500, and 300 mb charts and 500/1000 mb thickness charts for the special situations corresponding to the text. Some of the charts are analyzed and some not analyzed. The morning charts (03h surface and 06h upper air) cover the entire Altantic-Eurasian sector of the N. Hemisphere, whereas the evening (15h and 18h upper air) charts are usually confined to Europe (west of the Urals). Data from a dense network of stations appears on both surface and upper air charts. Charts and data are mostly for 1952, 1953 and 1955. *Subject Headings:* **1. Synoptic laboratory**

atlas 2. Synoptic analysis manuals 3. U.S.S.R. synoptic charts 4. U.S.S.R. I. Pogosian, Kh. P. (*ed.*) **II. Zverev, A. S.** (*ed.*).—*M.R.*

10.8—37 551.501.42:551.571

*Savich, V. A., **Psikhrometricheskie tablitsy.** [Psychrometric tables.] Leningrad, Gidrometeoizdat, **1957.** 251 p. Almost entirely tables. **DLC** (QC917.S37 1957)—Extensive and detailed tables (in a well bound edition of 17,000 copies) for calculating the humidity, saturation deficit and dew point at hydrometeorological stations or laboratories in all parts of the U.S.S.R.—whether desert, polar or alpine—for pressures of 550 to 1100 mb and temperatures of −70.0° to +49.9°C, using either a stationary or an aspiration psychrometer. The basic formulas used in preparing the tables, and the use of the tables, are outlined in the introduction. Appended tables give saturation vapor pressure (mb) for −40° to 0° over ice and 0° to 49.9°C over water, according to 2 formulas, and corresponding dew points, and tables for determining dew point from relative humidity. *Subject Headings:* **1. Psychrometric tables 2. Dew point tables 3. Soviet Hydrometeorological Service handbook.**—*M.R.*

TRANSLATIONS

See also: **Blind landing training** (Kononov, Kurkov), 10.8–111; **Electron density in ionosphere** (Al'pert), 10.8–189.

10.8—38 551.509.3:551.513:8.03(08)

*†Bagrov, N. A. and Morskoĭ, G. E. (*eds.*), **Voprosy predskazaniia pogody.** [Problems of weather forecasting.] Leningrad, Gidrometeoizdat, **1958.** 439 p. figs., tables, bibliog. at end of each ch., eqs. **DLC** (QC995.Bz)—This book, intended for fairly widespread use (3000 copies published), contains translations into Russian of 18 outstanding U. S. and German papers on general circulation theory, weather lore, numerical, short, extended and long range forecasting and on forecast verification, for periods of one hour to 30 days, written between 1939 and 1956 and published originally in the **Journal of Marine Research, Compendium of Meteorology, Meteorological Monographs, Journal of Meteorology, Tellus, Meteorologische Rundschau** and **Zeitschrift für Meteorologie.** The authors of these papers and citation in *MAB* are as follows: H. Riehl (*see* 5.5–58, May 1954, *MAB*), J. Namias (5.3–9), Franz Baur (3.6–1, 2B–186), R. Scherhag (3.3–59), R. White (7.3–129, 7.8–95), W. Leight (5.9–81), Irving Gringorten (2.4–29), E. Wahl (6.10–88), C.-G. Rossby (5F–4), B. Haurwitz (1940), R. Fjørtoft (4.10–71), J. Charney (5F–20), Phil D. Thompson (7.10–147), W. Klein (5.6–79) and M. Teich (8.7–143). All tables, maps, graphs and extensive bibliographies are carefully reproduced; the bibliographic citations in original (Roman) alphabet. *Subject Headings:* **1. Numerical forecasting 2. Long range forecasting 3. General circulation 4. Russian language textbooks 5. Translations.**—*M.R.*

10.8—39 551.583

†Shapley, Harlow (*ed.*), **Izmenenie klimata.** [Climatic change.] Ed. by I. M. Sheĭnis and S. Iu. Geller. Moscow, Izdatvo Inostrannoĭ Literatury, **1958.** 358 p. numerous figs. and tables. Bibliog. at end of each ch.—A nicely edited book containing translations into Russian of the 22 articles originally presented in English at the Conference on "Climatic Change", held at the American Academy of Arts and Sciences in Boston in May 1952. The subjects touched on astrophysics, paleontology, geophysics, geochemistry, climatology, anthropology, geography, geodesy, paleolimnology, geochronology, etc. Authors include H. Wexler, H. C. Willett, D. H. Menzel, R. F. Flint, J. L. Kulp, V. Conrad and J. H. Conover. (For abstract on the original English, pub. Cambridge, Mass., Harvard Univ. Press, 1953, *see* 5.11–183, Nov. 1954, *MAB*.) *Subject Headings:* **1. Climatic changes 2. Translations. I. Sheĭnis, I. M.** (*ed.*) **II. Geller, S. Iu.** (*ed.*)—*M.R.*

NEW SERIALS

10.8—40 551.510.42(05)

International Journal of Air Pollution, Vol. 1, No. 1/2, pub. N. Y., London, Pergamon Press, Oct. **1958.** Editors: R. S. Scorer; G. Nonhebel; John Pemberton and A. J. Haagen-

Smit. Subscription to private individuals: $10.00; to Institutions, etc.; $17.00 per vol. in advance, from Pergamon Press. Vol. 1. No. 1/2 has 153 p. **DWB, DLC** (RA576.A.15). Review by J. S. Sawyer in *Royal Meteorological Society, Quarterly Journal*, 85(363):77, Jan. **1959.**—A new, and apparently high quality, journal devoted to articles on scientific aspects of air pollution of interest to meteorologists, engineers, chemists and public health workers. Review articles for interdisciplinary workers, articles on radioactive waste disposal, on natural pollution by volcanos, dust and sea spray, pollen and insects, pollution control and removal, and other aspects of this broad field are, or will be, covered in the journal. The editors include R. S. Scorer of London and A. J. Haagen-Smit of Caltech; the Advisory Board includes H. A. Panofsky of Penn. State University, P. A. Sheppard and Sir Graham Sutton of London, and many other international figures. Papers will be in English, French or German (in the first issue, all are in English), and English abstracts are provided with each article. Extensive review of important books in the field, reports on symposia and meetings, and abstracts of papers presented at meetings, are appended in each issue. (For listing of contents, *see* Pt. III, p. 803, May 1959, *MAB*. All articles abstracted separately.) *Subject Headings:* **1. Serial publications 2. International Journal of Air Pollution 3. Atmospheric pollution periodicals.**—*M.R.*

10.8—41 523.4:629.19

Spaceflight, issued London by the British Interplanetary Society. Vol. 1, No. 1, Oct. **1956.** Latest issue seen, Vol. 1, No. 8, July **1958.** Quarterly. Free to members of the Society. Patrick Moore, ed. 12 Bessborough Gardens, London, S.W.1. **DLC**—The British Interplanetary Society has been publishing papers on various aspects of space flight in its bi-monthly Journal. However, it was felt that the Journal was too technical for the general public. Spaceflight is being published with the aim of translating information contained in the Journal into popular language, thus keeping the public informed about research conducted in the field of rocket developments, and also dealing with the many current misconceptions. The articles include explanatory diagrams and bibliographic references. *Subject Headings:* **1. Interplanetary flights 2. Serial publications. I. British Interplanetary Society II. Moore, P.** (*ed.*). —*G.T.*

10.8—42 550.3(05) 551.521.12

Bulletin de Géophysique, Montreal, No. 1, March **1957.** Latest issue seen, No. 5, April **1959.** No. 1, 40 p. No. 5, 52 p. Irregular. Issued by the Collège Jean-de-Brébeuf, Observatoire de Géophysique (3200 Chemin Ste-Catherine, Montreal 26, Canada) **DWB.**—The Geophysical Observatory (Montreal) issuing this journal has a seismological and a radiometeorology section. The Observatory's equipment is described in the foreword to the first issue. The *Bulletin* includes original articles (to be abstracted separately) as well as data on solar radiation and seismological values measured at the Observatory. (For listing of contents of the No. 5, April 1959, *see* Pt. III, 10(5):801, May 1959. *MAB.*) *Subject Headings:* **1. Geophysical periodicals 2. Solar radiation data 3. Serial publications.**—*G.T.*

GENERAL GEOPHYSICS AND METEOROLOGY

IGY

See also: **Rockoons, Arctic,** 10.8–54; **U. S. and Soviet IGY Antarctic exped.** (Laktionov), 10.8–60; **Geomag. observations in Polar regions** (Bartels), 10.8–108.

10.8—43. 551.506.21:550.3:061.3

†Gerson, N. C. (*Secy., U. S. National Com. for the IGY*), **From Polar years to IGY.** *Advances in Geophysics*, N. Y., Vol. 5:1–52, **1958.** 6 tables, bibliog. p. 48–52. **DWB, DLC**—A thorough, scholarly and enlightening account of the origin of the first and second Polar Years and the IGY enterprise: Weyprecht's contribution, organization networks, relative success and scientific results of each of these international undertakings, publications and data problems and possibility of need for another IGY in view of the asymptotic approach to a worldwide

network of geophysical stations from pole to pole. It is suggested that future efforts would likely be directed outward toward the solar system. Extensive quotations are made from the recommendations and resolutions of KARL WEYPRECHT, of the German Commission on Arctic Exploration, the Hamburg International Polar Conference (1879), and later bodies such as IMO, IUGG and CSAGI dealing with these matters. *Subject Headings:* **1. International Polar Year History 2. International Geophysical Year, 1957–1958. I. Weyprecht, Karl.**—*M.R.*

10.8—44 551.506.22

Marshack, Alexander, **The world in space: the story of the International Geophysical Year.** New York, Thomas Nelson & Sons, **1958.** 176 p. 87 figs. (incl. photos). **DWB**—A journalistic style book, full of action pictures, telling about the many aspects of IGY in all parts of the world and carried out by 64 countries. The information is valid through the launchings of the first 5 satellites in 1957–58. The chapters of the book cover: 1) the general plan of IGY; 2) man's first knowledge of the earth; 3) the oceans; 4) ice and glaciers; 5) atmosphere; 6) magnetic field of earth; 7) solid earth; 8) ionosphere, cosmic rays, airglow and aurora; 9) the sun and its influence, and 10) the rockets and satellites. A good subject index is appended. *Subject Headings:* **1. IGY program 2. Popular geophysics.**—*M.R.*

10.8—45 550.3:061.3:342.5

U. S. Congress. House. Committee on Appropriations, **National Science Foundation: hearings before the subcommittee of the Committee on Appropriations, House of Representatives, Eighty-fifth Congress, second session. . . .** Review of the first eleven months of the International Geophysical Year. Washington, U. S. Govt. Print. Off., **1958.** 1919 p. figs., tables. **DWB** (551.06 U582na)—These Hearings contain a wealth of information on all phases of the U. S. IGY activities and their preliminary results. In prepared statements and in reply to questions by members of the Congressional Subcommittee, a dozen witnesses, most of whom are in charge of one of the IGY programs (oceanography, glaciology, meteorology, seismology, ionosphere, cosmic radiation, aurora, rocket and satellite), explain the problems involved and action undertaken in the numerous scientific and technical tasks facing the participants in this vast enterprise. Although primarily concerned with the U. S. effort, the statements include ample reference to cooperation with other countries, including many examples of highly successful achievements in such cooperation. Accounts of experiences in the field (such as trips to the Antarctic, etc.) add a great deal of interesting detail to some of the testimony which, as a whole, constitutes one of the most informative and readable reports available on the subject. *Subject Headings:* **1. U. S. participation in IGY 2. Congressional hearings.**—*G.T.*

10.8—46 551.506.22(470

Zalemaev, V. S., **O zadachakh i deiatel'nosti Konsul'tativnoĭ komissii pri Prezidiume AN SSSR po podgotovke i provedeniiu Mezhdunarodnogo geofizicheskogo goda.** [Objectives and activities of the Advisory Commission at the Presidium of the Academy of Sciences of the U.S.S.R. on the preparation and conduct of the IGY.] *Akademiia Nauk SSSR, Izvestiia Ser. Geofiz.*, No. 7:965–967, July **1957. DLC**—The role of the Academy of Sciences of the U.S.S.R. in the conduct and supervision of the scientific participation of the U.S.S.R. in the IGY is described. The Advisory Committee in the Preparation and Conduct of the IGY was organized in the Presidium of the Academy of Sciences of the U.S.S.R. on Jan. 10, 1957, which is to be the organizing and coordinating center for all IGY activities in the U.S.S.R. The membership of this committee is listed; its powers and functions are described; its activities during 1957 are mentioned. *Subject Heading:* **1. Soviet participation in IGY.**—*I.L.D.*

10.8—47 551.510.53:551.506.2

Ben'kova, Natal'ia Pavlovna, **Mezhdunarodnyĭ geofizicheskiĭ god i issledovaniia verkhnikh sloev atmosfery.** [The International Geophysical Year and research in the upper layers of the atmosphere.] Moscow, Gosud. Izdatvo Literatury po Voprosam Sviazi i Radio, 1958 47 p. 18 figs., 12 refs. **DWB** (M10.53 B468me)—A general review of the IGY program is presented with a systematic discussion of investigations to be carried out in the upper atmospheric layers which are closely related to the propagation of short radio waves. These investigations

will include: 1) vertical soundings of the ionosphere (ionospheric stations and their operation, 20 such stations in the U.S.S.R.); 2) measurement of radio wave absorption in the ionosphere and of ionospheric winds and drifts; 3) study of atmospheric disturbances and geomagnetic variations; 4) studies of auroras and night sky glow; 5) investigations to be carried out with the aid of rockets and artificial satellites in the U.S.S.R. A calendar of regular world days and of world meteorological intervals is appended. *Subject Headings:* **1. IGY upper atmosphere programs 2. Upper atmosphere research.**—*A.M.P.*

WMO

10.8—48 551.587(09) 551.501.7

Van Mieghem, J., **The conquest of the third dimension: presidential address at the second session of the (W.M.O.) Commission for Aerology, Paris, June–July 1957, Pt. 1.** *World Meteorological Organization, WMO Bulletin*, 7(1):31–38, Jan. **1958.** 2 figs. **Pt. 2,** *Ibid.*, 7(2):52–58, April **1958.** 7 figs. **DWB**—History of upper air measurements since PÉRIER (on PASCAL's advice) in 1648, climbed the Puy de Dôme with meteorological instruments, and DE SAUSSURE in 1787 climbed Mont Blanc. Balloon ascents since 1783, with barometer, thermometer and hygrometer; the 28 scientific ascents of GLAISHER (1862–66) reaching a maximum height of 11.3 km, using the aneroid barometer for the first time; the use of recording instruments beginning in 1881; electrical measurements, magnetic, actinometric and upper air wind and cloud; optical and acoustical and atmospheric chemistry measurements at end of 19th century; the construction of aspirated psychrometers and balloon sondes by ASSMANN (1891 and 1893); use of kites (1844) at Blue Hill, kite network of U. S. W. B. (1897), free balloons (1892), pilot balloons, international aerological days (Nov. 14, 1896 et seq.), and the discovery of the stratosphere in 1902; development of aeroplane meteorographs, synoptic aerology, radiosondes, transosondes, use of guided missiles and other types of probes of the upper atmosphere are discussed and illustrated. There are now over 500 aerological sounding stations in the Northern Hemisphere and 100 in the Southern Hemisphere (52 in the tropics, 36 in temperate and 20 in the Antarctic zones). *Subject Headings:* **1. History of aerology 2. Aerological research 3. Aerological soundings 4. Transosondes 5. Aerological networks.**—*M.R.*

10.8—49 551.5:061.3

Logvinov, K. T., **O sessiakh Komissii po aerologii i Komissii po priboram i metodam nabliudenii Vsemirnoĭ meteorologicheskoĭ organizatsii.** [Sessions of the Commission on Aerology and Commission on Instruments and Methods of Observation of the WMO.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:56–58, Dec. **1957. DWB, DLC**—The second session of the Commission on Aerology and the Commission on Instruments and Methods of Observation of the WMO was held in Paris during June 18 to July 6, 1957. The proceedings and resolutions of the conference are summarized. With special reference to the IGY, the Commission on Aerology recommended the development of an aerological network in the southern network along the meridians 10°E long., 75°E long. 140°E long., and 180°E long. and also along the equator and 15°N lat. in the Atlantic and Pacific Oceans. Considerable discussion was aroused by the proposal of the U. S. to use transosondes in connection with the IGY. This proposal was opposed by the U.S.S.R. because these balloons infringe on sovereignty and endanger airplanes. The problems of using transosondes in the Southern Hemisphere was left to be decided by regional commissions. Various recommendations were made on the exchange of data, establishment of stations to study atmospheric nuclei, more precise determination of the tropopause, etc. The Commission on Instruments and Methods of Observation was concerned with reports on standardization of the technical properties of instruments and also with their construction, automatic meteorological stations, international comparison of barometers, etc. The names of the Soviet delegation and of the elected officers are listed. *Subject Headings:* **1. WMO Commission for Aerology 2. WMO Commission for Instruments and Methods of Observation.**—*I.L.D.*

10.8—50 551.5:061.3

World Meteorological Organization. Commission for Aerology, **Abridged final report of the Second Session, Paris, June 18–July 5, 1957.** *WMO, WMO* [Publications], No. 65. RP.

27, 1957. 75 p. forms. Price: Sw. fr. 3. **DWB** (M(06) W927p No. 65)—The Conference, under the chairmanship of J. VAN MIEGHEM (President), was attended by 87 delegates and observers from 43 countries. Agenda items included subjects ranging from definition of the tropopause, radiation constants, aerological diagrams, etc., to the jet stream, publication of aerological observations, sferics, ozone observations, and world climatic atlases. A total of 81 documents presented at the meeting are listed. Fourteen resolutions and 18 recommendations are given in detail. The transactions are abridged to a general summary (p. 7–27). R. C. SUTCLIFFE of the United Kingdom and W. L. GODSON of Canada were elected President and Vice President, respectively. *Subject Headings:* **1. WMO Commission for Aerology reports 2. Aerological problems.**—*M.R.*

ARCTIC RESEARCH

See also: **Oceanog. expeds.** (Makarov), 10.8–81; **Upper air obs., Arctic Ocean** (Zaĭchikov), 10.8–125; **Climate and weather, N. Greenland** (Hamilton), 10.8–144; **Fog particles, Arctic** (Robinson et al.), 10.8–289.

10.8—51 551.578.46:551.582(798,987)

Bilello, M. A., **A survey of Arctic snow-cover properties as related to climatic conditions.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report,* No. 39, Nov. **1957.** 9 p. 10 figs., 4 tables, 3 refs. **DWB, DLC.** Also in: *International Union of Geodesy and Geophysics: Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 4, publ. **1958.** p. 63–77. 10 figs., 4 tables, 3 refs. **DWB, DLC**—Data collected over 2–4 yrs in Alaska and the Canadian Arctic are analyzed for regional variations in snow cover density, temperature, and hardness as related to climate. Snow temperatures from Nov. to March averaged 4–9°C higher than air temperatures in Alaska and 4.5°C higher in Canada. Density in Alaska was 0.13–0.20 g/cm³ in Nov. and 0.23–0.27 in March, while in Canada the values were 0.30–0.36 in Nov. and 0.33–0.39 in March. Regional hardness variations resembled those for density. Snow hardness during the period of no melting was found to be related to densities from 0.15–0.36 g/cm³. Nomographs were developed for estimating average monthly snow cover density from mean air temperature and wind velocity for Nov.–March for the area N. of 62°N lat. and elevations below 1500 ft. A comparison between observed and derived values indicates that the method provides a reliable regional estimate of snow cover densities. *Subject Headings:* **1. Snow temperatures 2. Snow cover densities 3. Climate over snow cover 4. Snow hardness 5. Alaska 6. Canadian Arctic.**—*SIPRE abstract.*

10.8—52 550.3(98

Shapley, A. H. (*Natl. Bu. of Standards, Boulder, Colo.*), **Geographic distribution of geophysical stations on the polar cap.** (In: Polar Atmosphere Symposium, Oslo, July 2–8, 1956 **Proceedings, Pt. 2, Ionosphere Section.** N. Y., Pergamon Press, **1958.** p. 108.) Also issue in: *Journal of Atmospheric and Terrestrial Physics, London, Special Supplement,* Pt. 2, 1957 pub. **1958.** p. 108. **DLC**—This paper discusses the progress that is being made in the study of high atmosphere, and lists out names of all the stations north of 60° geomagnetic latitude o north of 60° geographic latitude which are engaged in the observations of ionospheric vertica soundings, the ionospheric absorption, the auroral patrol and the geomagnetic variations *Subject Heading:* **1. Arctic geophysical research.**—*N.N.*

10.8—53 551.582.1(98

†Grigor'ev, Andreĭ Aleksandrovich, **Subarktika.** [The Subarctic.] 2d ed. Moscow Akademiia Nauk, Institut Geografii, **1956.** 222 p. 2 charts, 17 tables, bibliog. p. 210–22 **DWB** (919.8 G857su). Earlier edition (about 170 p.) issued **1946. DLC** (G606.G7)—Th main part of this book deals with the geography, geology, flora, fauna, and marine life of th East European Subarctic (67°–75°N), although brief mention is made of conditions in Sub arctic America (Canada and Alaska) and Asia. Ch. II (p. 9–32), takes up the climate of th East European Subarctic, the radiation balance, temperature, atmospheric movements, win humidity, etc. of the summer and of the winter half of the year, respectively, with illustrativ tabular data for stations 67°–73°N. The second edition has been enlarged by 30%, and r

vised with respect to new data on solar radiation in the Arctic and its effect on life. *Subject Headings:* **1. Climate of European Subarctic 2. European Subarctic.**—*M.R.*

10.8—54 551.507.362.1:551.507.321(98)

Preliminary report on rockoon firings in the Arctic. *American Geophysical Union, Transactions*, 38(6):998–1000, Dec. **1957. DWB**—During the IGY (Aug. 5–14, 1957), the U. S. conducted 18 rockoon flights from the State University of Iowa. Rockoons were fired between lat. 55°N and 76°N in order to investigate the total cosmic ray intensity through and above the atmosphere in northern latitudes during that period of maximum sunspot activity. Physical nature, energy, intensity, latitude distribution of auroral "soft radiation," and atmospheric electrical currents were investigated. Correlation of fluctuations of upper atmosphere, cosmic ray intensity and high altitude magnetic data were made with solar and magnetic data from ground stations and with the records from nearby ground magnetic observatories, or related geophysical phenomena, respectively. Preliminary results indicated new facts at altitudes that ranged from 77 km to 132 km. *Subject Headings:* **1. Rocket soundings from balloons 2. Rockoons 3. Arctic.**—*N.N.*

10.8—55 551.510.535(98):016

†Agy, Vaughn, **Bibliography of Arctic ionospheric research in the United States and Alaska since 1949.** *U. S. National Bureau of Standards, NBS Report*, No. 5561, March 7, **1958.** 11 p. refs. Reproduced from typescript. **DWB**—The available unclassified material on Arctic ionospheric propagation of 1–30 Mc/s radio waves, including magnetic and auroral activities, is listed as follows: a) Papers in the literature, 23 items; b) Reports by private organizations, 50 items; c) Report of work by U. S. Government agencies, 15 items. Informative notes on the respective research programs and contracts listed are included. *Subject Headings:* **1. Arctic ionospheric research bibliographies 2. Ionospheric radio wave propagation in Arctic.**—*W.N.*

10.8—56 551.509.3(98) 551.513:551.557.5(98)

§Reed, Richard J., **Synoptic studies in Arctic meteorology.** Washington (State). Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)–1298 (Arctic Meteorology-Climatology), Occasional Report, No. 9; Final Report, July **1958.** 64 p. figs., tables, bibliogs. **DWB** (M(055) W319a)—This report contains summaries of a dozen different synoptic or statistical studies of the North American Arctic and Gulf of Alaska, made at the Univ. of Washington during the past 4 years: 1) in a cold low; 2) summer circulation in Arctic and Arctic jet stream, high winds at Arctic Stations; 3) structure of Arctic front and summer disturbances as revealed by cross sections; and 4) predictions at high latitudes. Appended are a more comprehensive paper on the Arctic jet stream, and a study of high winds at selected Arctic stations and a verification study of graphical-numerical predictions for Arctic charts, cross sections and data. *Subject Headings:* **1. Arctic synoptic studies 2. Arctic jet stream 3. North American Arctic.**—*M.R.*

ANTARCTIC RESEARCH

10.8—57 551.311.1(99) 551.521(99) 551.506.5

†*Loewe, Fritz, **Etudes de glaciologie en Terre Adélie, 1951–1952.** [Studies in glaciology in Adélie Land, 1951–1952.] *Expéditions Polaires Françaises. Missions Paul-Emile Victor [Résultats Scientifiques]*, Vol. 9, **1956.** 159 p. 10 figs., 8 plates, 49 tables, 137 refs. English, German and French summaries p. 137–140. (*Actualités Scientifiques et Industrielles*, No. 1247, pub. Paris, Hermann, **1956.**) **DLC** (Q111.A3). Review by H. H. Lamb in *Journal of Glaciology*, London, 3(22):148–149, Oct. **1957.**—A thorough monographic study of the radiation balance of the ice surface at Port Martin and on the continental ice at 80°S and 1800 m height. Equipment for measuring the radiation balance, observations, clear sky, cloudy sky, monthly mean radiation balance, heat transfer, temperature; heat balance of the air near the ground and lapse rates, the density, structure, movements and physical properties of the snow, névé and ice; and, finally, frequency and form are discussed. *Subject Headings:* **1. Radiation balance of Adélie Land 2. Glaciology of Adélie Land 3. Expéditions Polaires Françaises 4. Adélie Land 5. Antarctica. I. Victor, Paul-Émile.**—*M.R.*

10.8—58 551.586:612.014.43(99)

†Sapin-Jaloustre, Jean, **Enquête sur les gelures: à propos des observations de la Ire Expédition antarctique française en Terre Adélie 1948–1951.** [Investigation of frost injury based on observations of the first French Antarctic Expedition in Adélie Land, 1948–1951.] *Expéditions Polaires Françaises, Missions Paul-Émile Victor (Résultats Scientifiques)*, Vol. 10, **1956.** 190 p. 17 figs., 7 photos, tables, bibliog. p. 165–185. German and English summaries (*Actualités Scientifiques et Industrielles*, No. 1248, pub. Paris, Hermann, **1956**), **DLC** (Q111.A3)—A major monograph on various aspects of cold injury, based on clinical observations atTerre Adélie during the French Antarctic Expedition of 1948–1951. Notes on the climate of this, the "windiest place on earth," with graphs showing the mean monthly temperature and wind speed at Port Martin (67°S 141°E) compared with Little America and Paris, and of cooling power as a function of wind and of blizzard, show that although Port Martin is not as cold at any season as Little America (78½°S, 164°W) she has winds which average (for a month) 4 to 5 times as strong (30 mgs or 65 mph) in March as the more continental base and thus has during blizzards, especially (which double the cooling power), a far greater chilling effect than at the colder, but less windy, place. Clinical observations during the expedition, on fingers, feet and face, with chilling and warming by infrared and tests on rabbits, infections, nervous disorders, effects of exposure and of immersion, lesions, theories of action on vascular system and tissues, metabolism, actual effects on rectal and nasal discharges and finger temperature during immersion of hand in ice water. Treatment, prevention (effect of diet, alcohol, tobacco, morale, fear, battle, etc.) and acclimatization are also discussed on the basis of experience at Port Martin and elsewhere. *Subject Headings:* **1. Cold effects on man 2. Cooling power climate at Port Martin 3. Wind speed at Port Martin 4. Expéditions Polaires Françaises 5. Port Martin, Adélie Land.**—*M. R.*

10.8—59 551.584(99) 551.521(99)

Rusin, N. P., **Meteorologicheskiĭ rezhim antarkticheskikh oazisov i ikh vliianie na okruzhaiushchuiu ledianuiu poverkhnost'.** [Meteorological regime of the Antarctic oases and their effect on the surrounding ice surface.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:3–12, March **1958.** 6 figs., 8 tables, 4 refs., 4 eqs. **DWB, DLC**—In view of the fundamental role exerted by radiational factors and geographical conditions upon the meteorological regime of the warm period (Nov. to March) in Antarctica, the author investigated the influence of the radiational and heat balance upon the meteorological regime of the Antarctic oases (in particular, the Bunger Oasis) during Jan. 26–29, 1957, in clear weather. Analogous observations were made during Jan. 13 and 14, 1957 outside the Bunger Oasis on the snow cover at Depot Bay. Data in the forms of tables and graphs are presented for mean decadal air temperature for Nov., Dec. and Feb. (for Mirny, Pionerskaia and Oazis), daily variations of the radiation balance components on clear days in the Bunger Oasis, daily totals of radiation balance components for the Bunger Oasis and Depot Bay, daily variation of the radiation balance components on clear days at Depot Bay, daily variations of the components of heat balance at the Bunger Oasis and at Depot Bay, heat balance components at Bunger Oasis and Depot Bay, daily wind direction in the Bunger Oasis on clear days, mean wind velocity in Dec. and Jan. at Oazis and Mirny, temperature of the air and of the surface at the ground at Oazis and Mirny during the summer months, and the absolute and relative humidity during the summer for these two stations. The influence of the temperature conditions in the oasis upon the atmospheric temperature in adjoining areas is determined by the equation:

$$T(\zeta, \xi) = T_1 - T_2 + (T_{o_1} - T_{o_2})\, \mathrm{P}\left(\frac{\zeta^2}{2\xi}, 2n\right),$$

where $T(\zeta, \xi)$—temperature of the air mass moving outside the oasis, T_1 and T_2—temperature outside and within the oasis, respectively; T_{o_1} and T_{o_2}—temperature of the ground outside and in the oasis; $\mathrm{P}(2\zeta, 2n)$ probability functions; and ζ and ξ—dimensionless coordinates:

$$\zeta = \frac{2}{1 + 2\epsilon}\,(\eta)^{(1+2\epsilon)/2};\ \eta = \frac{z}{z_1},\ \xi = \frac{k_1\ x}{\mu_1\, z_1^2},$$

where ϵ—parameter, characterizing vertical stability of the atmosphere, k_1 and μ_1—coefficients

of turbulence and wind velocity at 1 meter, z and z_1 height of the measurements, x—distance at which the temperature effect of the oasis ceases. A graph giving the temperature effect of the oasis and initial data for computing the temperature effect are presented. *Subject Headings:* **1. Antarctic meteorology 2. Antarctic oases 3. Microclimatological research in Antarctic 4. Radiation balance in Antarctic 5. Antarctica.**

10.8—60 551.506.22(99)

Laktionov, Aleksandr Fedorovich, **Mezhdunarodnyĭ geofizicheskiĭ god v Antarktike.** [The International Geophysical Year in the Antarctic.] Leningrad, Gidrometizdat, **1957.** 178 p. 57 figs. (incl. maps, photos), 3 tables. **DWB** (551.06 L192me)—A popular (3000 copies) but technically accurate and detailed account of the plans for IGY Antarctic work both in the U.S.S.R. and abroad. The history of the 1st and 2nd Polar Years, and of the present Geophysical Year in its planning stages, the organization of the complex Soviet Antarctic expedition, its leaders, details of the preparatory expeditions, establishment and operation of Mirny, meteorological and aerological data for Mirny, Jan.–Aug. 1957; the complex network and research of the American Antarctic IGY program beginning in 1954/55; and in lesser detail the Australian, British and French programs. Many maps, photos and tables illustrate graphically the operations and the preliminary results, as well as the topography, sites of bases, ships. meteorological conditions, etc. *Subject Headings:* **1. IGY Antarctic expeditions 2. Soviet Antarctic IGY expeditions 3. U. S. IGY Antarctic expedition 4. International Polar Year,** —*M.R.*

10.8—61 551.506.5(99) 551.506.22(99)

Barber, Noel, **The white desert.** London, Hodder and Soughton, **1958.** 205 p. illus. **DLC** (G850 1955.B3). Also: Ross, Christian, **Last great land journey.** *Science News Letter*, Wash., D. C., 70(7):106–107, Aug. 18, **1956.** photo. **DWB, DLC.** Also: **British Antarctic expeditions.** *Science*, Wash., D. C., 124(3232):1142, Dec. 7, **1956. DLC—The white desert is** a readable account of the successful journey across the Antarctic Continent by Vivian Fuchs and Sir Edmond Hillary. The trans-Antarctic expedition was under the direction of the former, and the New Zealand support party under the latter. Members of both parties are listed and biographical sketches included for members of the Fuchs party. A diary of events from Nov. 14, 1955 when the "Theron" sailed from London, to March 2, 1958 when Fuchs arrived at Scott Base, and a list of important facts about the Antarctic, especially facts concerning the IGY effort, are included. Action photographs illustrate life, scientific activities, etc. and the text reports on much of the glaciological and meteorological work. Peter Jeffries of the British Meteorological Office, and Johannes La Grange of the South Africa Weather Bureau were meteorologists on the expedition. Tony Stewart of the R.A.F. Meteorological Branch (1944–50) was a member of the advance party. The author was press representative for the **London Daily Mail.** The articles by Ross and Barber gave projected plans for the Expedition and other British IGY activities. *Subject Headings:* **1. Trans-Antarctic Expedition, 1957–58 2. IGY Antarctic program 3. Fuchs, Vivian 4. Hillary, Sir Edmund 5. Antarctica.**—*M.R.*

SERVICES AND SOCIETIES

See also: **Geophys. stations, Arctic** (Shapley), 10.8–52; **Hist. of met., E. Germany** (Philipps), 10.8–69; **Agromet. services, Uzbek S.S.R.** (Kovalenko), 10.8–116.

10.8—62 551.5:061.2(43–11)

Lambor, J., **Inauguracyjny Zjazd Towarzystwa Meteorologicznego w NRD.** [Inaugural meeting of the Meteorological Society of East Germany.] *Przegląd Geofizyczny*, Warsaw, 3(1):63–64, **1958. DWB, DLC**—The meeting took place in East Berlin on 14–16 Oct. 1957 and was attended by about 200 representatives of East Germany (90%), Austria, Czechoslovakia, Hungary, Bulgaria, the Soviet Union (S. Khromov) and Poland. Only a part of the first meeting was dedicated to inaugural festivities of the Society; all others were scientific sessions during which 35 reports were presented and discussed. The topics of papers read during the five sessions were as follows: synoptics and aerology, atmospheric dynamics and

circulation, radiation and visibility, bioclimatology and agricultural meteorology, and the ionosphere. Twenty-two of the reports were published in the Dec. 1957 issue of *Zeitschrift für Meteorologie*. *Subject Heading:* **1. Meteorological Society of East Germany.**—*A.M.P.*

10.8—63 551.5:061.1

Ponomarenko, I. N. **Gidrometeorologicheskaia Sluzhba v Narodnoĭ Respublike Albanii.** [The hydrometeorological service of Albania.] *Meteorologiia i Gidrologiia*, Leningrad, 7:52–53, July **1957. DWB, DLC**—A national meteorological service began to be organized during 1945–1946. At that time the Ministry of Economics organized a small group of meteorologists and began to train observers and equip weather stations. In 1949 the Hydrometeorological Service was organized in the Institute of Science to which the entire meteorological and hydrological network was transferred, including the Central Synoptic stations at Tizana. The hydrometeorological service of Albania is comprised of more than 150 meteorological and rainfall stations, and about 60 hydrological stations. A description is given of the operation of individual stations, the types of observations carried out, the publications and transmission of observations and the services provided to the national economy. *Subject Headings:* **1. Albanian meteorological services 2. Albania.**—*I.L.D.*

10.8—64 551.5:061.1(09) (51)

Tu, Chang-wang, **Rŏzwoj służby meteorologicznej w Chinach.** [Development of the meteorological service in China.] *Przegląd Geofizyczny*, Warsaw, 3(1):57–60, **1958. DWB, DLC**—A glowing picture of remarkable successes achieved since the installation of Communist rule in 1949 is presented. The number of meteorological and aerological stations and observatories increased by 20 times and now total more than 1000. A new network of climatological and agrometeorological stations is being organized. All meteorological equipment, with the exception of automatic instruments, is being manufactured in China. The accuracy of weather forecasts is 75%. Weather information and typhoon forecasting play an important role in the development of agriculture and the warning of approaching disasters. New scientific institutions in various fields of theoretical and applied meteorology are being developed. Schools for the training of the personnel of the meteorological service have been opened in all provinces and autonomous districts of China (about 10,000 employees have already completed the training). In spite of these successes, the author lists a number of shortcomings and outlines a 12-year plan which would bring the Chinese meteorological service to the desired level by 1967. The main objectives are: 1) improvement in training of employees, 2) development of scientific and research work, 3) improvement of the quality of existing equipment and the designing of new instruments. *Subject Headings:* **1. Meteorological service development 2. Chinese meteorological service 3. China.**—*A.M.P.*

CONFERENCES AND SYMPOSIA

See also: **Atmos. chemistry, 10.8–178.**

10.8—65 551.521.1(08)

World Symposium on Applied Solar Energy, Phoenix, Arizona, Nov. 1–5, 1955, **Proceedings (of the Symposium) sponsored by the Association for Applied Solar Energy, Stanford Research Institute, and University of Arizona.** Published and distributed by Stanford Research Institute, Menlo Park, California, **1956.** 304 p. figs., photos, refs. Ports. and biographical sketches of authors. **DLC** (TJ810.A82)—A two-day **Conference on the use of Solar Energy** was held at the Univ. of Arizona, Tucson, on Oct. 31–Nov. 1, 1955. At this meeting 96 technical and scientific papers were presented. This meeting was followed by the above mentioned World Symposium on Applied Solar Energy, in Phoenix. About 900 registrants from 36 countries attended the two conferences, and nearly 30,000 people attended the exhibits of solar devices and models. Twenty-six papers presented at the World Symposium on Applied Solar Energy are contained in this volume. Photographs of some of the representation, the sessions, banquet and prominent personages at the head table, many of the types of equipment on display at the engineering exhibit; remarks on the future of solar energy use, the association, remarks at the sessions and biographies of the authors are included in the large volume. The

papers cover such subjects as the sun's energy, economics of solar energy, solar machines, solar stills, solar houses, heating and cooling, food from solar energy, electricity from the sun, etc. (For listing of papers, *see* Pt. III, p. 483, March 1959, *MAB*. Papers abstracted separately.) *Subject Headings:* **1. Solar energy symposium 2. Association for Applied Solar Energy 3. Tucson, Arizona 4. Phoenix, Arizona. I. Stanford Research Institute II. Arizona University III. Association for Applied Solar Energy.**—*M.R.*

10.8—66 551.521.1:061.3

Conference on the Use of Solar Energy: the Scientific Bases, Univ. of Arizona, 1955, **Transactions of the Conference, Tucson, Arizona, Oct. 31–Nov. 1, 1955.** Sponsored by University of Arizona, Association for Applied Solar Energy and Stanford Research Institute. Tucson, Arizona, Univ. of Arizona Press, **1958.** 6 vol. in 5. figs., tables, refs. and eqs. Price: $12.50 per set. Contents: Vol. 1, The available energy: Measurement of the radiation. Vol. 2, Thermal processes, Pt. 1 (in two vols.). Vol. 3, Thermal processes, Pt. 2. Vol. 4, Photochemical processes. Vol. 5, Electrical processes. All articles in Vol. 1–3 abstracted separately. (For listing of these articles, *see* Pt. III, p. 467, March 1959, *MAB*.) **DWB** (532.72 A719in), **DLC** (TJ 810.C6 1955)—In this international conference held at Tucson, Ariz. the discussions centered around the following: the solar energy collector design, selective radiation, selective spectral characteristics as an important factor in the efficiency of solar collectors, solar radiation apparatus, the evaluation of flat-plate solar-collector performance, solar collector studies at the University of Minnesota, the application of thermal circuit analysis to collector design, the prospects for various uses for solar reflectors as a means of environmental control of microclimates in agriculture and, finally, a few remarks are offered on the use of direct-beam radiation in architecture and agriculture. *Subject Headings:* **1. Solar energy conferences. I. Carpenter, Edwin F.** (*ed.*) **II. Arizona Univ. III. Association for Applied Solar Energy, Phoenix, Ariz. IV. Stanford Research Institute, Menlo Park, Calif.**—*N.N.*

10.8—67 551.510.42:061.3

†Thring, M. W., (*ed.*), **Air pollution: based on papers given at a Conference held at the University of Sheffield, Sept. 1956.** London, Butterworths Scientific Publications, **1957.** 248 p. figs., bibliogs. **DWB** (M10.42 T531ai)—The fifteen papers included in this volume deal with several aspects of air pollution, namely: its chemical constituents and their measurement, harmful effects on health, vegetation and materials, diffusion of gases, protective measures against different types of pollution, and legislation. The meteorological aspect is covered in the two papers: A. Garhett, **Atmospheric pollution: geographical factors** (p. 73–113) and C. H. Bosanquet, **The flow of chimney gases** (p. 114–123). (Both papers are being abstracted separately.) *Subject Heading:* **1. Atmospheric pollution conferences.**—*G.T.*

10.8—68 551.509.313:061.3

Belousov, S. L., **Mezhdunarodnaia konferentsiia po chislennym metodam prognoza.** [International Conference on Numerical Forecasting.] *Meteorologiia i Gidrologiia*, Leningrad, 9:58–59, **1957. DWB, DLC** English trans. by Valyz Zilius issued by American Meteorological Society under Contract AF 19(604)-1936, Sept. **1958.** (4 script p.)—A report of the International Conference on Numerical Forecasting that was held in Stockholm in June 1957. The papers presented at the conference included the following: development of the hydrodynamic method of forecasting in the U.S.S.R. (E. N. Blinova and I. A. Kibel'); the use of the Green function in solving the problem of short range forecasting by means of electronic computers (Belousov); numerical forecasting in the U. S. in the Joint Numerical Weather Prediction Unit (G. Arnason); investigation of the errors of numerical solution of forecast equations solved by electronic computers; graphical methods of forecasting; solution of the "equation of balance" establishing a more exact relationship between the gradient pressure and wave velocity; forecasting pressure change near frontal zones by using a double layer model with potential temperature as vertical coordinates; long range forecasting by hydrodynamic methods; practical rain forecasting (Smagorinsky), etc. *Subject Headings:* **1. Numerical forecasting conferences 2. Short range forecasting 3. Long range forecasting.**—*I.L.D.*

EDUCATION, HISTORY AND BIOGRAPHY

HISTORY

See also: **Rocket development** (Schieldrop), 10.8–31; **Oceanog. expeds.** (Makarov), 10.8–81; **Hist. weather records, Peru** (Raimondi, Paz Soldan), 10.8–141.

10.8—69 551.5:061.2(09)

Philipps, H., **Rückschauende Betrachtungen zur Meteorologie.** [Retrospective consideration on meteorology.] *Zeitschrift für Meteorologie*, Berlin, 11(10/11):290–299, Oct./Nov. **1957. DWB, DLC**—On the occasion of the first meeting of the Meteorological Society of the German Democratic Republic, the author reviews the principal developments in meteorology from its origin as a branch of physics. While the first weather service was established in France in 1863 and proposals for the idea of a weather service already had been made by LAVOISIER and LAMARCK, the first weather map was made by G. BRANDES some 40 years earlier and the telegraph had been used by KREIL to disseminate weather information nine years before the Crimean War, the event which led to the establishment of a weather service. The construction of weather maps led to the formulation of Buys Ballot's law (which was actually formulated first by BRANDES in 1783 but remained unnoticed) and the need for synoptic studies led to the establishment of national and international societies. The achievement of a three dimensional analysis of atmospheric processes took place in 1934 when the first high altitude charts began to be constructed. The discussion includes an account of the development of a more satisfactory and profound theory of the atmospheric circulation by V. BJERKNES, FICKER's work on the complex variation of atmospheric pressure at low elevations and the role of the stratosphere in its formation, the unification of the polar front and tropopause waves by J. BJERKNES, and the role of atmospheric radiation in weather processes. The unsatisfactory state of progress in forecasting is attributed to the fact that forecasting is essentially a matter of empirical extrapolation; little or no consideration has been given to physical quantitative analysis of weather processes. The importance of physical dynamic analysis in short and long range weather forecasting is discussed. *Subject Headings:* **1. History of meteorology 2. Progress in meteorology 3. Meteorological Society of East Germany.**—*I.L.D.*

10.8—70 551.593.63

Berg, Hellmut, **Eine alte Darstellung einer Haloerscheinung.** [An old illustration of a halo phenomenon.] *Meteorologische Rundschau*, 11(1):36–37, Jan./Feb. **1958.** fig., 3 refs. **DWB, DLC**—Various old descriptions of halo phenomena published during the 17th and 18th centuries are mentioned and a more detailed description of a halo is given by the Norwegian PAUL EBER in 1551 and reproduced by HELLMANN in *Neudrucke von Schriften und Karten für Meteorologie und Erdmagnetismus*, No. 12 (Berlin, **1899**). In this brief note the author reproduces a sketch of a halo phenomenon observed above Heidelberg in 1622. The engraving found in the Kurpfalz Museum of Heidelberg has no author. It represents two different phases of the same phenomenon. The engraving is reproduced and explained by the author. *Subject Heading:* **1. Halos in historic records.**—*I.L.D.*

BIOGRAPHY

See also: **Biog. of Iu. M. Shokal'skiĭ,** 10.8–1; Oceanog. expeds. (Makarov), 10.8–81.

10.8—71 551.5:92

Bossolasco, Mario, **Nel primo centenario della nascita di Luigi de Marchi.** [First centennial of the birth of Luigi de Marchi.] *Geofisica e Meteorologia*, Genoa, 5(5/6):73, Sept./Oct. **1957. DWB**—LUIGI DE MARCHI was born in Milan May 16, 1857 and died in Padua Feb. 15, 1936. A general tribute to his contributions to geophysics and meteorology is presented. He was the first in Italy to apply mathematical-physical methods to geophysical problems. *Subject Headings:* **1. Biography of Luigi de Marchi 2. Marchi, L. de.**—*I.L.D.*

10.8—72 551.5:92

Reach for the stars. *Time*, N. Y., 71(7):21–25, Feb. 17, **1958.** photo. Full page color photo on cover. **DLC**—A graphic account of the life and work of WERNHER VON BRAUN in

Germany and the U. S. (since 1945), and the work of his team at Huntsville, Ala., that led to the successful launching of the Redstone and Jupiter C (Explorer II) satellite on Jan. 31, 1958. *Subject Headings:* **1. Biography of Wernher von Braun 2. von Braun, Wernher 3. Explorer II launching 4. Satellites observatories.**—*M.R.*

10.8—73 551.5:92

Brandejs, S., **Prof. Dr. Alois Gregor pětašedesátníkem.** [Prof. Dr. Alois Gregor at 65.] *Meteorologické Zprávy*, Prague, 10(3):57, **1957.** photo. Also in French: **M. Le Professeur Aloyse Gregor âgé de soixante-cinq ans,** in *Studia Geophysica et Geodaetica*, Prague, 1(1):196, **1957. DWB**—A. GREGOR has served at the Czechoslovak Meteorological Institute for over 30 yrs, first as head of the Climatological Division and from 1945 as Director of the Institute. During the past several years he has been a professor of meteorology and climatology at the University of Prague. He is internationally known for his climatological and bioclimatological classification systems and his studies in applied climatology. *Subject Headings:* **1. Biography of Alois Gregor 2. Gregor, Alois.**—*G.T.*

10.8—74 551.5:92

[**Obituary note on**] **Edward Schulman.** *American Meteorological Society, Bulletin*, 39(2):97–98, Feb. **1958. DWB, DLC**—EDWARD SCHULMAN, dendrochronologist of the University of Arizona Laboratory of Tree Ring Research, was born in 1908 and died in 1958. He has been credited with the discovery in California of the oldest living thing, a new group of bristlecone pine trees more than 4000 yrs old. A brief account of his scientific career is given. *Subject Headings:* **1. Obituaries 2. Schulman, Edward.**—*I.L.D.*

BIBLIOGRAPHY

See also: **Arctic ionospheric res. bibliogs.** (Agy), 10.8–55.

10.8—75 629.19:016 551.507.362:016

†Benton, Mildred, (*comp.*) (*Library Branch, Technical Information Division, N.R.L., Wash. D. C.*), **Literature of space science and exploration.** *U. S. Naval Research Laboratory, Bibliography*, No. 13, Sept. **1958.** 264 p. **DWB** (016.629 U5851i)—Annotated bibliography with author and subject index, comprising 2274 references to literature for the period 1903 to June 1958, on all aspects of rockets and satellites, astronautics, moon stations, etc. *Subject Headings:* **1. Astronautics bibliographies 2. Space science bibliographies.**—*M.R.*

10.8—76 551.582.1(564.3,4–015):016

†Wallace, James Allen (*Office of Climatology, U. S. W. B.*), **Bibliography on the climate of Cyprus.** Wash., D. C. U. S. Weather Bureau, March **1958.** 40 p. 102 annotated refs. **DWB** (M82.1/564 U587bi)—About 100 annotated references to works on the climate of Cyprus and that portion of the Mediterranean, with a subject and author index appended. The material covers the period 1869–1958. A great many of the references are to material of general areal coverage, containing some data specifically applicable to Cyprus or the Mediterranean. *Subject Headings:* **1. Bibliography on climate of Cyprus 2. Bibliography on climate of Mediterranean 3. Cyprus 4. Mediterranean Region.**—*M.R.*

10.8—77 551.582.1:(016)(548.2,468.2,4–015)

†Wallace, J. Allen, Jr. (*Foreign Area Section Office of Climatology*), **Bibliography on climate of Malta and Gibraltar.** Wash., D. C., Directorate of Climatology, Air Weather Service, July **1958.** 52 p. 120 items. **DWB** (M(016) U587bm)—Abstracts are arranged under: I. Sources of both Malta and Gibraltar; II. for Malta; III. for Gibraltar, IV. for Mediterranean area. Indexes are provided by date of publication, alphabetically by author, by class number and by subject heading. *Subject Headings:* **1. Climate of Mediterranean 2. Bibliography on climate of Malta and Gibraltar 3. Malta 4. Gibraltar 5. Mediterranean Region.**—*M.R.*

GLOSSARIES

10.8—78 523.4:629.19(09)

Spitz, Armand and Gaynor, Frank, **Dictionary of astronomy and astronautics.** N. Y., Philosophical Library, **1958.** 439 p.—Short, terse definitions of over 2000 terms in astronomy, astronautics and upper atmospheric physics, are included in this up-to-date glossary. Some of the terms are defined at greater length and a great deal of astronomical data about the sun, moon, planets and their orbits and satellites, constellations plus some excellent photographs of the moon, Saturn, sunspots, etc. are included. Most of the constellations, recent artificial satellite programs, and some astrological terms are defined. *Subject Headings:* **1. Astronautics glossaries 2. Glossaries.**—*M.R.*

10.8—79 551.579(038)

Sweet, James S. (*comp.*), **American-Russian, Russian-American hydrologic vocabulary.** Wash., D. C., U. S. Weather Bureau, June **1958.** 24 p. **DWB**—The Russian equivalents of about 300 words most frequently used in Russian or American hydrological literature are given alphabetically in English in the first part and according to the Russian alphabet in the second part. *Subject Headings:* **1. Russian-English hydrological glossary 2. Hydrological glossaries.** —*M.R.*

PRACTICAL AND APPLIED METEOROLOGY

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: **Advances in oceanog.,** 10.8–2; **Ocean-atmos. interaction** (Redfield et al.), 10.8–3; **Coll. reprints in oceanog.,** 10.8–4; **Gulf Stream text.** (Stommel), 10.8–10; **Bathythermograph processing manuals** (Richmond), 10.8–34; **Buoy weather stations** (Bascom), 10.8–145; **Saline nuclei concentration meas., Dublin** (Metnieks), 10.8–281.

10.8—80 551.465

†Doodson, A. T. (*Liverpool Obs. and Tidal Institute, Liverpool*), **Oceanic tides.** *Advances in Geophysics,* N. Y., Vol. 5:117–152, **1958.** 10 figs., 41 refs., eqs. **DWB, DLC**—Review of historical and most recent data and theories on ocean tides, causes, effects of periods, tidal charts by empirical methods (5 methods described and illustrated for Pacific Ocean), theoretical investigations for whole earth and for oceans bounded by meridians and for actual oceans. Errors and imperfections and possibilities for eliminating them (effects of coasts, capes, bogs, islands, tidal currents, internal tides, gravitation and earth tides). *Subject Headings:* **1. Ocean tides 2. Advance in tide research.**—*M.R.*

10.8—81 551.46(265,262.5)

Makarov, Stepan Osipovich, **Okeanograficheskie raboty.** [Oceanographic work.] Moscow, Gosud. Izdatvo. Geograficheskoĭ Literatury, **1950.** 276 p. figs. (fold. in back). **DLC** (GC7.M3) (5000 copies)—A biographical sketch (p. 3–28) on the great pioneer Russian oceanographer, Admiral S. O. Makarov, is followed by a reproduction of his work **Ob obmene vod Chernogo i sredizemnogo morei** [Exchange of waters of the Black and Mediterranean Seas], published in 1885 by the Akademiia Nauk, which goes into a general discussion of ocean currents, current observations in the Bosporus and instruments used for that purpose, results of observations in the Bosporus, fluctuations in level of Black Sea and Sea of Marmora, study of currents and water masses in seas, archipelagos and gulfs. The second main work (p. 97–252) reproduced is that on the "Vitiaz" Expedition and the Pacific Ocean, consisting of results of hydrographic and oceanographic observations in the Pacific during 1886–1889, and temperature data for the North Pacific Ocean. In this work instruments are described, in detail the ship's log is abstracted, temperature data given for each part of the North Pacific and each bordering sea and for the Kuroshio and Arctic Ocean and notes given on conduct of oceanographic observations from ships. Finally, on p. 255–275 is a work on **Hydrological investigations conducted in 1895 and 1896 in the Laperuz Gulf and other places,** published after his death in 1905, by Akademiia Nauk, giving details of the work on this Gulf in the Sea of Japan and some discussion of observations in the Mediterranean, Red Sea, Indian Ocean on the way

to the Sea of Japan, and in the China Sea and Pacific Ocean. Observations on surface and deep water temperatures, currents, bottom contours, and waves are discussed. Charts show isotherms for each month in the Formosa Strait, cross sections of water temperature and structure, line drawings of bathymeters and Richard recording thermograph, etc. A chart shows the route of the "Vitiaz" around the world in 1886–89. Sources of articles and works reprinted are not given. *Subject Headings:* **1. Collected works of S. O. Makarov 2. Oceanographic expeditions 3. "Vitiaz" Expedition, 1886–1889 4. North Pacific 5. Black Sea 6. Laperuz Gulf, Japan Sea 7. Bosporus. I. Zubov, N. N.** (*ed.*) **II. Dobroval'skiĭ** (*ed.*).—*M.R.*

10.8—82 551.46:539.16

Arlman, J. J. (*Philips-Roxane Ltd.*); Santema, P. and Svasek, J. N. (*both, Rijkswaterstaat, Netherlands Ministry of Transport*), **Movement of bottom sediment in coastal waters by currents and waves; measurements with the aid of radioactive tracers in the Netherlands.** *U. S. Beach Erosion Board, Technical Memorandum*, No. 105, March **1958.** 56 p. 29 figs., tables, foot refs., 13 eqs. **DWB** (551.46 U582b No. 105), **DLC**—The report presents the results of recent work done in the Netherlands. The authors first discuss sediment movement by currents and waves, and ordinary methods of measuring them; then they discuss methods of introducing and using radioactive tracers. The characteristics of various isotopes are tabulated with a view to their possible use for various types of coastal experimentation. A pilot experiment to measure sediment transport in a hydraulic model by use of irradiated glass pearls is discussed, and it was concluded that sediment transport can be safely measured by this method. *Subject Headings:* **1. Ocean sediment movement 2. Radioactive tracers in oceanography.**—*A.M.P.*

10.8—83 551.46(265)

Brodie, J. W. and Burling, R. W. (*both, New Zealand Oceanog. Inst., Wellington, N. Z.*), **Age determinations of southern ocean waters.** *Nature*, London, 181(4602):107–108, Jan. 11, **1958.** 3 refs. **DWB**—In Dec. 1956 and Jan. 1957 twenty-gallon samples of ocean bottom water were obtained at two stations in the Southern Ocean south of New Zealand. The stations were located at (1) Lat. 64°54′S, long. 178°10′E, 150 mi north of Scott Island; depth to bottom 3000 m, depth of sample 2643 m, (2) Lat. 53°38′S, long. 169°52′E, 100 mi southeast of Campbell Is., depth to bottom 800 m, depth of sample 765 m. The apparent C^{14} ages of the two samples were 2540 ± 100 yrs and 1900 ± 100 yrs, respectively. The maximum age of deep Atlantic water had already been reported to be 1950 ± 200 yrs for a sample from 4623 m in the northwest Atlantic. Initial observations are now being continued by the New Zealand Oceanographic Institute over the above and more northerly latitudes. *Subject Headings:* **1. Ocean water dating 2. Southwestern Pacific.**—*N.N.*

10.8—84 551.46 551.581

Fleming, Richard H. (*Dept. of Oceanog., Univ. of Washington*), **General features of the oceans.** *Geological Society of America, Memoir* 67, Vol. 1:87–108, **1957.** 10 figs., 23 refs. **DLC.** Also issued as *Washington (State). Univ. Contributions in Oceanography.* No. 206. **DGS**—The physical, chemical, geological and biological features of the oceans that depend on latitude, season, atmospheric circulation and coastal features, and the features of present day circulation that give some clue to the climate and circulation (atmospheric and oceanic) of the geological past, are described and illustrated. A chart showing the difference in annual range of temperature of surface waters off the west and east coast of the U. S. and Mexico illustrates the effect of land masses. Latitudinal effects on precipitation and evaporation over the oceans are also shown on graphs. *Subject Headings:* **1. Oceanic features 2. Latitude influences on the ocean.**—*M.R.*

10.8—85 551.465(266)

Barnes, Clifford A. and Paquette, Robert G. (*both, Univ. of Washington, Seattle*), **Circulation near the Washington Coast.** *Pacific Science Congress, 8th, Philippines, Nov.* 16–28, 1953, *Proceedings*, Vol. 3, pub. Univ. of the Philippines, **1957.** p. 585–608. 10 figs., 3 tables, 15 refs.—The Geomagnetic Electro-Kinetograph (G.E.K.) was used in measuring circulation patterns and dynamic topographies, but the results were found to be considerably in error (al-

though the currents identified were found to be real), when compared with direct current measurements. Outflow from the Columbia River and the Straits of Juan de Tuca was traced seaward (200 mi for the Columbia). Net currents obtained from averaging G.E.K. differ from those obtained from dynamic topographies because the former represent ephemeral wind currents and the latter represent long period effects. A section of the northeast Pacific from 44° to 51°N and from the Washington State Coast for 600 mi out to sea was surveyed in late spring and summer of 1952 and 1953 by the M. S. "Brown Bear" during 7 off-shore cruises. *Subject Headings:* **1. Oceanographic surveys of North Pacific 2. Oceanic circulation calculations 3. Geomagnetic Electro-Kinetograph (G.E.K.) measurements 4. "Brown Bear" Cruise, 1952–53 5. Washington Coast 6. Northeast Pacific.**—*M.R.*

10.8—86 551.46(979)

Barnes, Clifford A.; Lincoln, John H. and Rattray, Maurice, Jr. (*all, Univ. of Wash., Seattle*), **Oceanographic model of Puget Sound.** *Pacific Science Congress, 8th, Philippines, Nov. 16–28, 1953, Proceedings*, Vol. 3, pub. Univ. of the Philippines, **1957.** p. 686–704. 10 figs.—An elaborate scale-model of the Puget Sound Basin (Washington State), with its deep channels and mountainous islands, and many rivers having large volume runoff from rain in winter and snow melt in spring and early summer, was constructed at the University of Washington, and the model and its use in studying tidal and other effects on currents, salinity, etc. is described and illustrated. A density structure has been produced which approaches the actual density structure under corresponding conditions. *Subject Headings:* **1. Oceanographic models 2. Tidal effects on salinity 3. Puget Sound, Wash.**—*M.R.*

10.8—87 551.526.6(265/366):551.583.15

Rodewald, Martin, **Das Kalte pazifische Jahr 1955 (Beiträge zur Klimaschwankung im Meere, 9. Beitrag).** [The cooling of the surface waters in the Pacific Ocean in 1955. (Contribution to the climatic change in the sea, Pt. 9).] *Deutsche Hydrographische Zeitschrift*, Hamburg, 10(4):151–157, Aug. **1957.** 3 figs., 4 tables, ref. German, English and French summaries p. 151. **DWB**—Sea surface temperatures along the Pacific Coast of S. and N. America from the Aleutians of S. Chile, and in the Pacific Islands during 1955 showed a decided negative temperature anomaly which in many places broke records of 17 (Washington State) to 29 yrs (San Francisco). Only in the Philippines was there a positive anomaly. Tables give local and regional anomalies for areas arranged longitudinally and across the Pacific (WSW-ENE and SE-NW). Also the seasonal variations in anomaly for 10 areas and for groups of areas are shown graphically, and the circulation model for the N and S Pacific which would give rise to such anomalies is shown on a chart. The year 1955 stands out as coldest in contrast to 1926 which was the warmest water year in the Pacific. *Subject Headings:* **1. Cold water year, 1955 2. Sea surface temperature anomalies 3. Pacific Ocean 4. Philippines.**—*M.R.*

10.8–88 551.46(

†*Richards, Francis A., **Some current aspects of chemical oceanography.** *Physics and Chemistry of the Earth*, Vol. 2, N. Y., Pergamon Press, **1957.** p. 77–128. 5 tables, bibliog. p. 119–128. **DWB** (551 P578), **DLC** (QC501.P53)—A review of the recent extensive literature on chemical oceanography, the major constituents, anomalies in the chlorinity ratios, properties of sea water dependent on these ratios, physiochemical properties (chlorinity, salinity, density, foaming, viscosity, refractive index, surface tension, slicks, thermal coefficients, boiling point), minor constituents of sea water, isotopic composition of sea water, dissolved atmospheric gases, solubility of gases, determination of dissolved oxygen and CO_2); biochemical relations in the ocean, organic matter in the oceans, oxygen consumption, silicon, micro-nutrients, nutrient salts and phosphorous compounds in the ocean. A bibliography of about 300 articles on chemical oceanography published through 1955 is appended. *Subject Headings:* **1. Chemical oceanography 2. Chemical composition of sea water.**—*M.R.*

10.8—89 551.556:551.46(36

Timonov, V. V., **Postanovka issledovaniĭ po probleme vzaimodeĭstviia atmosfery i gidrosfery v Severnoĭ chasti Atlanticheskogo okeana.** [Ways of investigation of the problem of th

interaction between the atmosphere and the hydrosphere in the North Atlantic.] *Leningrad. Gidrometeorologicheskiĭ Institut, Materialy konferentsii po probleme vzaimodeĭstviia atmosfery i gidrosfery v severnoĭ chasti Atlanticheskogo okeana*, Vol. 1, pub. Leningrad, **1958.** p. 19–23. **DWB**—The problem of the interaction of atmosphere and ocean in the Northern Hemisphere, being investigated in connection with the IGY by the Leningrad Hydrometeorological Institute, Principal Geophysical Observatory, etc., is divided into a number of principal parts, namely: wind currents and associated distribution and position of hydrological fronts; transport of ice in the ocean and its effect upon the hydrological conditions of the ocean; and processes of heat receipt and expenditure through the ocean surface. These questions are investigated by computing hydrological processes on the basis of meteorological conditions, and by developing the underlying theory for such computations. Thus A. A. GIRS investigates the relationship between the transformation of atmospheric circulation over the North Atlantic and hydrological processes in the ocean and attempts to classify temperature and pressure fields over the North Atlantic. A theory of the origin of currents by wind action and a method for approximate calculation of wind currents have been developed by P. S. LINEIKIN and B. I. TINRIAKOV, respectively. The variation in the transport of ice from the Arctic basin and Baffin Sea is being investigated by D. L .LAIKHTMAN and M. L. RUZIN, and observations on the drift of ice are being conducted by K. I. KUDRIAVAIA, G. D. REKHTZAMER, and E. M. BEZNAEV. The thermal processes of the North Atlantic are being investigated by L. A. STROKIN and E. O. ARKHIPOVA, who is investigating the annual variation of heat balance by means of ship weather data; also the transport of heat to lower depths and advection of heat currents are being studied. *Subject Headings:* **1. Ocean-atmosphere interaction 2. North Atlantic.**—*I.L.D.*

10.8—90 551.509(26):387

Blowers, K., **Using the shipping forecasts: coastal waters.** *Marine Observer*, London, 28(180):90–93, April **1958.** 2 figs., table **DLC**—The B.B.C. Light Programme has been issuing improved and more technical weather bulletins for shipping since April, 1956. A chart included in this paper was drawn from information given in the general synopsis of the shipping forecast broadcast at 0745 B.S.T. on May 2, 1956; its features are explained. *Subject Headings:* **1. Marine forecasting 2. Popular meteorology.**—*N.N.*

ASTRONAUTICS—SATELLITE OBSERVATORIES

See also: **Wernher von Braun,** 10.8–72; **Space science bibliogs.** (Benton), 10.8–75.

10.8—91 551.507.362.2

*Smithsonian Institution. Astrophysical Observatory, **Explorer IV—1958 Epsilon orbital data series, Issue 1,** Aug. 11, **1958.** 183 p. 7 figs., almost entirely tables. Also: **Issue 2,** Aug. 25, **1958.** p. 184–480; **Issue 3,** Sept. 16, **1958.** p. 481–871; and **Issue 4,** Sept. 30, **1958.** p. 872–1515. **DSI**—In *Issue* No. 1, orbital positions of earth satellite 1958 Epsilon (Explorer IV), as calculated for one minute intervals by the Smithsonian Astrophysical Observatory in contract with the Army Ballistic Missile Agency and with participation of their computation laboratory, are presented. Orbits are presented for one week (July 26–Aug. 1) along with a description of satellite characteristics and graphical illustration of orbits, etc. Baker-Nunn photographs, minitrack, microlock, moonwatch and radar observations were used in preparing the ephemeris which gives positions in geographic latitude and longitude. Longitudes are given in degrees east, heights in km with accuracy of $\pm 0.25°$ and height of 10 km. *Issue* No. 2 covers Aug. 2–12; *Issue* No. 3, Aug. 13–27 (noon) and *Issue* No. 4, Aug. 27–Sept. 19, 1958. *Subject Headings:* **1. Explorer IV—1958 Epsilon orbital data 2. Satellite observational data 3. Explorer IV characteristics. I. U. S. Army Ballistic Missile Agency, Redstone Arsenal, Alabama.**—*M.R.*

10.8—92 551.507.362.2:629.19:533.6

*Chapman, Dean R., (*Ames Aeronautical Lab., Moffett Field, Calif.*), **An approximate analytical method for studying entry into planetary atmospheres.** *U. S. National Advisory Committee for Aeronautics, Technical Note,* 4276, May **1958.** 101 p. 28 figs., table, 18 refs., diags. **DWB** (629.1308 U585tn)—The complete pair of motion equations for entry into an ex-

ponential atmosphere is reduced to an ordinary, nonlinear differential equation of second order by introducing a certain mathematical transformation. This differential equation includes terms representing the gravity force, centrifugal force, lift force, drag force, and vertical acceleration. Solutions obtained for different types of entry are universal in the sense that a single solution determines the motion and heating of a vehicle of arbitrary weight, dimensions, and shape entering an arbitrary planetary atmosphere. Study is made of the decelerations, heating rates and total heat absorbed for entry into Venus, Earth, Mars, and Jupiter. *Subject Headings:* **1. Rocket entry into atmosphere 2. Astronautics.**—*Author's abstract.*

10.8—93 551.507.362.2:551.515

Dryden, Warren A., **Useful satellite orbits for some high-altitude weather observations.** Florida. State Univ. Dept. of Meteorology, Contract AF 19(604)-1754, Scientific Report No. 1, Aug. 15, **1958.** 31 p. 11 figs., table, 2 refs., 9 eqs.—A discussion of the utilization of an artificial, unmanned satellite for the purpose of tracking atmospheric disturbances is presented. The disturbances are presumed to be recognized by cloud patterns viewed from high altitudes by means of a satellite-borne television camera which transmits an image to a telemetering station at the surface. Successive positions and, hence, the movements of these disturbed areas would be determined from the known position of the satellite. The usefulness of a satellite orbiting under the influence of its mutual gravitational attraction with the earth is presumed to be determined by the longitudinal displacements from day to day. The daily displacement is found to be a linear function of the elevation of the satellite. The direction of motion relative to the earth's equator also determines the usefulness of an orbit. As an example, it is found that a circular orbit with an elevation of 800 km is desirable for tracking middle-latitude disturbances, while the angle between the orbital plane and the earth's equatorial plane is less critical. The more easily attainable elliptic orbits are treated briefly. It is shown that the longitudinal displacements are not simply functions of the elevation—as in the circular case—but also of the speed at some point in the orbit such as perigee. *Subject Headings:* **1. Satellite observatories 2. Atmospheric disturbance tracking from satellites.**—*Author's abstract.*

10.8—94 551.507.362.2

Hergenhahn, G., **Die Bahn des Satelliten 1958 δ 2.** [The trajectory of satellite 1958 δ 2.] *Die Naturwissenschaften*, Berlin, 45(18):434–435, Sept. 15, **1958.** fig., 4 refs. **DLC**—After 370 measurements of the Doppler-effect it was possible to deduce the elements of the satellite trajectory 1958 δ 2 (Sputnik III). The measurements were made over the 15 May–2 July 1958 period. The research about the time changes of the satellite revolution has given remarkable results, commented upon in chronological order by the author. *Subject Headings:* **1. Satellite observatory trajectories 2. Soviet satellite Delta 2, 1958.**—*A. V.*

10.8—95 551.510.535:551.507.362.2:621.396.

Kitchen, F. A. and Joy, W. R. R. (*both, Royal Naval Scientific Service*), **Some effects of the fine structure of the ionosphere on transmissions received from the Russian earth satellite 1958β.** *Nature*, London, 181(4626):1759–1761, June 28, **1958.** 3 figs., table, 7 refs. **DWB**—After some simultaneous direction-finding and Doppler frequency-shift measurements had been made on the radio transmissions from the Russian satellite 1958β, on a frequency of 20.005 Mc/s with the initial object of obtaining the parameters of local tracks and those of the orbit, the authors set up a table for Portsdown, Eng. during the period May 16–22, 1958. Interesting anomalies observed then are listed. *Subject Headings:* **1. Ionospheric radio wave propagation anomalies 2. Ionospheric observations with satellites 3. Satellite tracking.**—*N. N.*

10.8—96 629.19:551.510.53

King-Hele, D. G. and Leslie, D. C. M., Dr. (*both, Royal Aircraft Estab., Farnborough*), **Effect of air drag on the orbit of the Russian earth satellite 1957β: Comparison of theory and observation.** *Nature*, London, 181(4626):1761–1763, June 28, **1958.** 2 figs., table, 3 refs, 8 eqs. **DWB**—Air drag is often encountered near perigee when the orbit of an earth satellite has an eccentricity greater than about 0.02. As a result, there is a retardation near perigee,

reduction in height at the next apogee, and very little decrease in perigee height. Thus the orbit contracts and becomes more nearly circular, while the orbital period decreases because the major axis is diminishing. Equations and the assumptions for their solutions are given. *Subject Headings:* 1. **Satellite orbits** 2. **Outer atmosphere.**—*N.N.*

GLACIER ICE AND SEA ICE

See also: **Radiation balance, Adélie Land** (Loewe), 10.8–57.

10.8—97 551.311.12:551.57

Sharp, Robert P. (*Calif. Inst. of Tech., Pasadena*), **The latest major advance of Malaspina Glacier, Alaska.** *Geographical Review*, N. Y., 48(1):16–26, Jan. **1958.** 6 figs. (incl. photos), 13 foot-refs. **DWB, DLC**—The author presents information showing that the Malaspina Glacier participated in the general advance of glaciers which took place at different times in different places within the past 300 yrs and that the culmination of its latest advance occurred 200 yrs ago. The physical setting of this glacier that covers about 900 square mi on the flat coastal foreland of southern Alaska, between Yakutat Bay on the east and Ivy Bay on the west, is described with the aid of a location map. The balance between supply and demand is strongly negative. Downwasting has produced a mantle of ablation debris that ranges from 2 to 3 ft of thickness at the outer edge of the glacier to a thin scattering of stones and sand 1.5 to 2 mi in from the margin. On the surface of Malaspina Glacier, over a marginal zone about a mile in width, a dense vegetation cover has developed. An estimated 50 to 150 ft of ice still underlies the superglacial forest. No perennial vegetation could gain foothold upon the mantle until ice movement had ceased. The culmination of the latest advance probably occurred not less than 50 years ago and possibly 100 before the 100-year old spruce trees took root. Interglacial forest remains are described. *Subject Headings:* 1. **Glacial advances** 2. **Glacial ablation** 3. **Malaspina Glacier, Alaska.**—*I.L.D.*

10.8—98 551.311.13

Okhotnikov, V. N., **Ledniki na Poliarnom Urale.** [Glaciers of the North Urals.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 90(2):174–175, March/April, **1958.** 3 figs., 2 refs. **DLC**—The glaciers of the Polar Urals constitute two groups: those between the Malaloe Shchuch'e and Usviaty Lakes and those west of Bol'shoe Khadata-Iugan-Lor Lake; there are eight glaciers in both regions. The two largest glaciers are the Malokarskiĭ glacier, situated near the sources of the Malaia Kara River and the Vostochnyi (Eastern) glacier, situated east of the former on the other side of the watershed, near the source of the right tributary of the Malaia Kara River. The Malokarskiĭ glacier is situated at the foot of 2 peaks. Its cirque is shaped like a cup with almost vertical walls and a bottom diameter of 600–700 m. The glacier descends from the northwest side of the cirque. The bottom of the cirque is covered with ice to a depth of 50–70 m. The southern and eastern walls of the cirque contain narrow hollows filled with firn feeding the glacier. On issuing from the cirque the glacier acquires a northerly direction. At the point of bending the glacier is covered with firn and, as its drop becomes more steep, its width diminishes to 170–200 m. Farther to the north, at a distance of 900 m, the glacier retains its steep drop and widens to 200–270 m. At the terminal point of the glacier, grottoes 30 m long and 8–10 m high are present. The total length of the glacier is 1.0–2.2 km. The moraines and surface of the glacier are described. *Subject Headings:* 1. **Glaciers** 2. **Urals.**—*I.L.D.*

10.8—99 551.509.59:551.311.182

Shuliakovskiĭ, L. G., **Razvitie metodov prognozov ledovykh iavleniĭ na rekakh v Tsentral'nom institute prognozov.** [Development of methods of forecasting river ice phenomena in the Central Forecasting Institute.] *Moscow, Tsentral'nyĭ Institut Prognozov, Trudy*, No. 73:42–47, **1957.** **DLC**—The method of V. Iu. Vize and of G. P. Bregman and G. Ia. Vangengeim for forecasting the break up of river ice is described. The latter method takes into consideration the conditions of the underlying surface and quantitative criteria for the behavior of the atmospheric circulation. On the basis of this method, the Central Forecasting Institute developed a method for forecasting ice break up, utilizing the air temperature during the winter

months over the European U.S.S.R. rather than the temperature of the surface waters of the oceans. Methods were developed for forecasting the freeze and break up of Siberian rivers. Many of the methods employed the circulation index developed by POGOSIAN and SAVCHENKOV. The methods for short range forecasting of river freeze and break up, method of forecasting for individual rivers, forecasting the formation of ice jams, forecasting ice phenomena in reservoirs, etc. are summarized and the names of individual investigators associated with the work of ice forecasting are mentioned. *Subject Headings:* **1. River ice forecasting 2. Ice breakup forecasting.**—*I.L.D.*

10.8—100 551.311.182

Kemmerikh, A. O., **Ledovyĭ rezhim rek.** [Ice regime of rivers.] *Priroda*, Moscow, 47(1):128, Jan. **1958. DLC**—The large expanse of the Soviet Union from north to south and west to east causes the great diversity in climatic conditions and, hence, in the diversity of the ice regime of its rivers. While some of the rivers are covered with ice in the summer, many of the small rivers of the Black Sea slope of the Caucasus and some of the Carpathian streams of the Dniester are subject to floods in January. The rivers of the Crimean, and usually those of the Caucasus and Tian-Shan, do not freeze up. The river ice is thickest in northeast Siberia attaining a thickness of 2m toward the end of winter. Relative to the rivers of European U.S.S.R., the thickness of the river ice is less. Even in the most severe January frosts, the most rapidly flowing parts of the rivers of Siberia, the Kola Peninsula, etc., do not freeze up. The formation of underwater ice is discussed. *Subject Headings:* **1. River ice 2. Ice thickness 3. U.S.S.R.**—*I.L.D.*

10.8—101 551.506.3:551.311.182(282.251.3)

Chist'iakov, G. E., **Vskrytie i zamerzanie r. Leny.** [Ice breakup and freezing of the Lena River.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:44, **1958.** table, 2 refs. **DWB, DLC**—The latest ice breakup on the Lena River occurred on June 7, 1843 and the earliest May 7, 1943; Owing to its great length there is a month's difference between the beginning of ice breakup on the upper reaches of the river (3985 km from the mouth) and at the lower reaches (215 km from the mouth). In recent years the mean dates of river ice breakup in European Russia have been earlier and the dates of freeze-up later, as a result of the warming of the earth's climate. Data are presented showing that, in comparison with the 19th century, the dates of river ice breakup on the Lena are a week earlier but for the entire period (1827–1955) it is three days. The average dates of freezing are three days later (Nov. 2) in comparison to the 19th century (Oct. 30) and two days later for the entire period. *Subject Headings:* **1. Ice breakup date 2. River ice 3. Lena River, U.S.S.R.**—*I.L.D.*

SEISMOLOGY

10.8—102 550.34:623.454

Burke-Gaffney, T. N. (*Riverview College Obs., Riverview, N.S.W.*) and Bullen, K. E. (*Dept. of Applied Math., Univ. of Sydney*), **On the seismological aspects of the 1954 hydrogen bomb explosions.** *Australian Journal of Physics*, Melbourne, 11(3):318–321, Sept. **1958.** 2 tables, 4 refs. **DLC**—Tentative conclusions previously drawn from an analysis of seismic readings of four 1954 hydrogen bomb explosions are re-examined in the light of source data subsequently released on these explosions. The released data show that the authors' earlier computed origin times for the four explosions were correct within 0.0, 0.4, 0.7, and 0.1 sec, respectively. The re-examination shows that the J. B. P tables need a correction of -2.2 ± 1.0 sec for surface epicenters in the mid Pacific and recordings at continental stations. It is confirmed that any difference between the P travel-times from Bikini to Australia and Bikini to the U. S. is not much more than $\frac{1}{2}$ sec. The authors' previous inferences on the velocities of air waves from the explosions remain undisturbed. The re-examination confirms the occurrence of diffracted PKP waves in front of the 142° caustic, and confirms that these diffracted waves arrive at times significantly earlier than PKIKP waves. *Subject Heading:* **1. H-bomb seismic waves.** *Authors' abstract.*

10.8—103 550.342

Darbyshire, J. and Iyer, H. M., **Some recent developments in the study of microseisms in Great Britain and the United States.** *Geophysical Journal*, London, 1(2):180–184, June, **1958.** 31 refs. **DWB**—Although microseisms, the small earth tremors of period 4–10s and amplitude up to 10μ, have been studied for nearly 80 yrs, many of the results and conclusions obtained are still controversial. The controversy has been centered mainly around the work done in Britain and the U. S. An attempt will be made in this article to give an account of the present position of the work in both countries and to suggest ways and means by which agreement can be reached. *Subject Headings:* **1. Microseisms research 2. Great Britain 3. United States.**—*Authors' abstract.*

10.8—104 550.34:662.2:539.1

Bolt, B. A. (*Dept. of Applied Mathematics, Univ. of Sydney*); Doyle, H. A. (*Dept. of Geophysics, Australian Natl. Univ., Canberra*) and Sutton, D. J. (*Dept. of Physics, Adelaide*), **Seismic observations from the 1956 atomic explosions in Australia.** *Geophysical Journal*, London, 1(2):135-145, June **1958.** 3 figs., 2 tables, 19 refs., eqs. **DWB**—A discussion is given of seismic observations from the four 1956 British atomic explosions, at Maralinga, in South Australia. Both P and S phases were observed at field stations set up along the Trans-Australian railway for $0.4° < \Delta < 11°$, and on a Benioff seismograph located near Adelaide at 8°. The travel-times indicate a P_n velocity of 8.21 ± 0.005 km/s and an S_n velocity of 4.75 ± 0.01 km/s. There is also evidence for P and S phases travelling near the surface with velocities of 6.03 ± 0.09 km/s and 3.55 ± 0.04 km/s, respectively. No onsets corresponding to paths through intermediate layers were observed. The observations can be explained by a single crustal layer having constant seismic velocities. This hypothesis gives a crustal thickness of 32 km from P and 39 km from S. The paper contains a more detailed treatment of the Maralinga data previously discussed by Doyle. These data have provided the first published studies of Australian crustal structure based on refraction methods. *Subject Headings:* **1. Seismological data 2. Atomic explosions 3. Australia.**—*Authors' abstract.*

GEOMAGNETISM

10.8—105 523.75:550.385

Lepineux, M, **Discrimination des éruptions chromosphériques associées aux perturbations géomagnétiques durant le maximum solaire actuel.** [Discrimination of chromosphere eruptions associated with geomagnetic disturbances during the present solar maximum.] *Académie des Sciences, Paris, Comptes Rendus*, 247(1):109-111, July 7, **1958.** 2 tables, 5 refs. **DLC**—The author considers the period of the well-defined solar maximum from April 15, 1957 to March 31, 1958. He splits up the important chromosphere eruptions into two categories. On the one hand, those which are accompanied by a well-marked and rather long-lasting increase of the radioelectric noise range on frequencies near 200 Mc/s. These eruptions generally occur during a pre-falling of the cosmic rays. Such eruptions determine, 20 to 70 hrs afterwards, a disturbance of the terrestrial magnetism, if they happen sufficiently close to the center of the apparent disc. On the other hand, those which are not accompanied by this long increase of the radioelectric noise on 200 Mc/s, whatever their position and importance, are not associated with geomagnetic disturbances. *Subject Headings:* **1. Chromosphere eruptions 2. Geomagnetic disturbances 3. Solar activity.**—*A. V.*

10.8—106 550.383:621.31

Herzenberg, A. (*Physical Lab. Univ. of Manchester, Eng.*), **Geomagnetic dynamos.** *Annales de Géophysique*, Paris, 14(4):522–524, Oct./Dec. **1958.** 2 figs., 2 refs. French and English summaries p. 522. **DLC.** Review by T. G. Cowling in *Nature*, London, 183(4666):937–938, April 4, **1959.**—This report proves that it is possible to postulate a pattern of motions in a homogeneous sphere of isotropic conducting material such that the whole arrangement acts as a steady dynamo producing a magnetic field extending outside the sphere. There can, therefore, be no general theorem to rule out the possibility that the geomagnetic field is due to a dynamo in the earth's core. The proof is rigorous; it uses a model consisting of two

eddies in the earth's core and does no more than provide an existence theorem; it is not suggested that the motions in the earth's core have the simple form assumed. *Subject Headings* **1. Geomagnetic dynamos 2. Geomagnetic field.**—*Author's abstract.*

10.8—107 550.385

Grenet, Gaston and Will, Roland, **Remarques sur les amplitudes de certaines perturbations magnétiques pulsatoires.** [Notes on the amplitudes of certain pulsatory magnetic disturbances.] *Annales de Géophysique*, Paris, 14(4):530–532, Oct.–Dec. **1958.** table, 2 refs **DLC**—The statistical distribution of certain magnetic disturbances presenting the characteristic of damped oscillations is evidence that the reduction of the number of disturbances in the daytime can be explained by fading. The fact that no privileged amplitude exists, demonstrates that the threshold, from which the oscillations start, is dependent upon the importance of the disturbing cause (probably the importance of the ionized cloud resulting from the sun) *Subject Headings:* **1. Magnetic disturbances 2. Amplitudes.**—*A. V.*

10.8—108 550.380.8

Bartels, J., **Geomagnetic observatories in polar regions.** *International Geophysical Year 1957/1958, Comité Spécial, Bulletin d'Information*, No. 7:52–58, **1956. DWB**—For correct and complete records of the variations of the magnetic field an ideal observatory with standard storm magnetographs, as well as a quick-run recorder of the La Cour type and the induction variometers of the Thellier type, must be provided. The paper gives further details on these instruments. An interesting remark on earth currents has been added here by Mrs. V. Troitskaya of the Geophysical Institute, Academy of Sciences, Moscow. *Subject Headings* **1. Geomagnetic instruments 2. Earth currents.**—*N. N.*

10.8—109 550.38

Köhler, Karl, **Grundlagen für die Auswertung von magnetischen Anomalien (insbesondere Z-Komponente).** [Basis for the evaluation of magnetic anomalies, especially the Z-component.] *Freiberger Forschungshefte, Ser. C, Geophysik*, Berlin, No. 41, Jan. **1958.** 128 p. 65 figs. 11 tables (1 fold.), 182 refs., eqs. **DWB**—A major monograph outlining in detail the method of evaluating local geomagnetic anomalies in the vertical field intensity, the relation between the geological structure and magnetic anomalies, experimental results compared with theoretical models, the relation between the local and the general geomagnetic field, the effect of accuracy of measurements with respect to interpretation of weak fields, isolated anomalies changes in fields, etc., accompanied by mathematical and graphical models, cross sections diagrams and other representations of the vertical magnetic field anomalies. *Subject Headings* **1. Geomagnetic anomalies 2. Vertical magnetic intensities.**—*M. R.*

AERONAUTICAL METEOROLOGY

See also: **Rocket development** (Schieldrop), 10.8–31; **Spaceflight,** 10.8–41; **The 4-D plotter** (Gringorten), 10.8–124, **Airport visibility, Begumpet Airport, India** (Chandiramani), 10.8–290; **Hail damage to aircraft, Johannesburg** 10.8–307.

10.8—110 551.574.12:629.13.0

Lewis, James P. and Ruggeri, Robert S. (*both, Lewis Flight Propulsion Laboratory, Cleveland*), **Experimental droplet impingement on four bodies of revolution.** *U. S. National Advisory Committee of Aeronautics, Technical Note*, 4092, Dec. **1957.** 61 p. 26 figs. (incl. photos) 2 tables, 11 refs. 5 eqs. **DWB, DLC**—The rate and area of cloud droplet impingement on four bodies of revolution were obtained experimentally in the NACA Lewis icing tunnel. Spheres ellipsoidal forebodies of fineness ratios of 2.5 and 3.0, and a conical forebody of 30° included angle were studied at angles of attack of 0° to 6°, rotational speeds up to 1200 rpm, and an air speed of 157 kn. The results are presented in the form of dimensionless impingement parameters in order to cover a wide range of flight and atmospheric conditions. *Subject Headings* **1. Drop impingement on propellers.**—*Authors' abstract.*

10.8—111 551.5:629.13

Kononov, I. I. and Kurkov, L. F., **The training of pilots prior to flights under adverse weather conditions.** (Trans. from original Russian in *Vestnik Vozdushnogo Flota*, No. 4, 1957.) Trans. issued as U. S. Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio, Air Technical Intelligence Translation, AF-WP-Dec. 1957, p. 51–55. 4 figs. **DWB** (M:629.13 K82tr)—This Air Force Bulletin contains training-type or advisory articles on various aspects of military aviation, especially under adverse weather conditions. The article by KONONOV and KURKOV stresses the problem of landing when one or more navigational instruments fail. Emphasis is on training for such emergencies. *Subject Heading:* **1. Blind landing training.**—*M.R.*

10.8—112 551.556:551.575.4(481):629.13

Dokken, Brynjolf, **The effect of the fjord winds on flying conditions at Fornebu.** *Meteorologiske Annaler*, Oslo, 4(6):87–122, **1957.** 21 tables. **DLC**—The winds in Oslo Fjord influencing visibility and cloudiness at Fornebu reach their climax at Faerder and their minimum point at Oslo. The winds blowing towards Oslo converge longitudinally with an ascending tendency and those from Oslo diverge longitudinally with a subsiding tendency. The air current is guided by mountains and ridges and is determined by the pressure gradient along the fjord. The compression waves caused by southerly winds result in a rising inversion, while the expansion waves are caused by an inversion and northerly wind causes a sinking inversion beginning at the farther end of Oslo Fjord and leading inwards. Since the ridge at Fornebu partly swerves northerly winds, the effect of expansion water is particularly strong in the case of northeasterly winds. But the shape of Oslo Fjord modifies these conditions since the bottleneck at Drobak hampers the face passage of winds. Using as parameters the force and direction of winds at Faerder, the author investigated statistically the following: the rates between surface winds and geostrophic winds at Fornebu at 1200 GMT in summer, the deviation of surface winds towards lower pressures at Fornebu in summer at 1200 GMT, the ratio between surface winds and geostrophic winds at Fornebu at 12 GMT in winter and the deviation of the surface wind towards lower pressure at Fornebu in winter at 1200 GMT, the direction of the air current above Oslo on the surface map in winter, winds causing precipitation (in particular föhn winds at Fornebu, dry weather cloud base in winter, the cloud base at Fornebu in wet weather in winter and visibility at Fornebu in dry and wet weather in winter. *Subject Headings:* **1. Wind effects on flying weather 2. Fjord winds 3. Oslo Fjord 4. Fornebu, Norway.**—*I.L.D.*

10.8—113 551.509.34:656.71(795)

*U. S. Weather Bureau, **Terminal forecasting reference manual: Portland International Airport, Portland, Oregon.** Wash., D. C., U. S. Weather Bureau, Jan. **1957.** 18 p. 13 figs., table, 13 + 7 refs. **DWB** (M09 U587t)—A concise summary of the facts and data on smoke, visibility, cloud heights, precipitation, thunder, fog, winds, etc. for Portland, Oreg. Airport. Data are presented in graphical and tabular form. Diurnal as well as seasonal variations are clearly brought out by curves based on hourly data for varying periods of 4–7 yrs. Sources of data, periods of record, local topography and references to literature concerning the Portland, Oreg. area, especially as concerns flying weather, are included. *Subject Headings:* **1. Local forecast studies 2. Airport climatic data 3. Portland International Airport, Oreg.**—*M.R.*

AGRICULTURAL METEOROLOGY

See also: **Farming weather, Gt. Britain** (Smith), 10.8–28.

10.8—114 551.521.1:551.588.2:634.75

Suzuki, S.; Arai, T. and Hamase, K., **Strawberry cultivation on staircase-like slopes.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 21(1):9–16, **1957.** 9 figs., 3 photos, 3 tables, 4 refs. In Japanese; English summary p. 14–15. **DLC**—The most favorable strawberry beds for receiving solar radiation by day should be so inclined that the slope faces perpendicularly to incident solar rays at noon (the sun at the Meridian). Consequently, if the day of bringing strawberries to market is known and if the suitable variety of the plant is chosen, the slope inclination required can be calculated by solving a trigonometrical

equation which contains the terms of the latitude of the place and of the declination on the da of marketing. For example, a certain part of Shizuoka Prefecture noted as an early strawberr growing area lies on the latitude of 35°N, and the farmers there at one time needed to put straw berries on the market as early as at the beginning of February. The inclination of slope to mee this demand is easily found by means of the equation, and it is 64°52′. These staircase-lik beds have another great advantage in that their bed walls serve as windbreaks protecting th plants from the cold winds of prevailing northwestern monsoon. The terraced beds shoul have a sloping surface tiled with thick V-notched concrete slabs. The following 5 characteris tic properties of the sloping beds are confirmed by about a year's time-to-time observation (1) The middle rows of terraced beds always have higher temperatures in the soil and in th overlying air than any other rows and than those on level ground. (2) All the maximum tem peratures of the terraced bed are attained earlier than those of beds on level ground—about a hour earlier. (3) The range of daily temperature variation in terraced beds is unmistakabl smaller than that of the beds on level ground at the corresponding depths. (4) Experiments o the tiles of greater thermal diffusibility than the earth soil prove that the terrace has a tendenc to be more moderate in climate, compared with the level earth surface. (5) The albedo o inclined beds is less than that of the level earth surface, either in the bare state or in the vege tated throughout the entire day. So we may say that strawberries raised on the slope of suc inclination and construction enjoy more sunlight than those cultivated on level ground. *Sub ject Headings:* **1. Strawberry culture 2. Radiation on oriented slopes 3. Slope climatology** —*Authors' abstract.*

10.8—115 551.525.4:633.

†Riley, John A., Jr. (*W. B. Airport Station, Des Moines, Iowa*), **Soil temperatures as relate to corn yield in central Iowa.** *Monthly Weather Review*, Wash., D. C., 85(12):393–400, De **1957.** 4 figs., 5 tables, 24 refs., eqs. **DWB, DLC**—Elaborate diagrams show the relation soil temperatures to 72″ depth at Ames, Iowa (Experimental Farm) for 1938–53, and cor development during various stages of its life cycle. Also the relation of hours of sunshin rainfall, air temperature, and other factors affecting soil temperature, or cycle of soil temper ture, are reviewed and illustrated graphically. Crop yield-soil temperature relationships a then discussed at length and illustrated by means of scatter diagrams and regression formula Conclusion is that corn yield can be forecast by using a regression equation based on soil ter perature alone, though soil moisture might eventually be incorporated in the equation to in prove accuracy. Results of other authors along similar lines are reviewed. *Subject Heading* **1. Soil temperature effects on corn yield 2. Corn 3. Ames, Iowa.**—*M.R.*

10.8—116 551.5:677.

Kovalenko, V. P., **Agrometeorologicheskoe obsluzhivanie sel'skogo khoziaĭstva Uzbe skoĭ SSR.** [Agrometeorological service for agriculture in the Uzbek S.S.R.] *Meteorologiia Gidrologiia*, Leningrad, No. 5:51–53, May **1957. DWB**—The services of the Tashkent Meteo logical Observatory to cotton production from the time of its cultivation to harvesting are scribed. These include studies on soil moisture accumulation, five day determination of s moisture before sowing, forecasting of late spring frosts, sampling of boll formation, etc. *Su ject Headings:* **1. Agrometeorological Services 2. Cotton production 3. Cotton weath services 4. Uzbek S.S.R.**—*I.L.D.*

10.8—117 551.584.43:633.11:631.67(

*†Belukhina, G. V., **Fitoklimat iarovoĭ pshenitsy v usloviiakh orosheniia na Evropeĭs territorii SSSR.** [Plant climate of spring wheat under irrigation in European U.S.S.R *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 53:105–141, **1957.** 10 figs., 19 tab 25 refs. **DLC**—A study of the phytoclimatic characteristics of irrigated spring wheat and the relationship between the meteorological regime of a wheat field and those recorded in instrument shelter (so as to be able to evaluate the agrometeorological conditions of crop grov from the observations of the nearest weather station) was carried out over the period 1952–1 in various parts of the European territories of the U.S.S.R. (Crimean, Chkalov, and Ros Oblasts). Observations in an irrigated field included temperature and humidity of the ai

, 10, 25, 50, 100, 150 and 200 cm, fixed maximum and minimum temperatures at the height of heat, wind velocity at 1 and 2 m above the ground, radiation albedo, soil temperatures, etc. he discussion and analysis include the following: heat balance of the active surface of an irrigated wheat field and importance of the individual constituents in the formation of the phytoimate, namely: total evaporation and its constituents on irrigated fields; calculation of total vaporation according to moisture deficit at 1300 o'clock, reserves of productive moisture in the oil and developmental condition of the plants; heat exchange between the active surface and ne atmosphere including conditions determining the character of heat and moisture exchange n an irrigated wheat field; direction and magnitude of heat flow between active surface and ir; heat exchange in the soil; radiational balance including role of direct radiation in the formaon of the phytoclimate; the effect of irrigation upon the variation of the radiational balance nd its constituents; and the daily variation of radiation balance and the elements of the phytoimate (air temperature and moisture); comparative properties of the components of the heat alance; nature of the relationship between the values of the meteorological elements at the vel of plant height and those in the instrument shelter of the nearest meteorological station, amely, the characteristics of the temperature and moisture regimes on irrigated and nonirrigated wheat fields; and reduction of the injurious effect of sukhovei winds by means of irrigaon. *Subject Headings:* **1. Field microclimatology 2. Irrigated fields 3. Spring wheat European U.S.S.R.**—*I.L.D.*

10.8—118 551.524.37:632.111:634

Kemmer, E. and Steckel, W., **Zur Frage der Veränderung von Holzfrostschäden bei Obstgeölzen.** [The modification of frost damage to fruit trees.] *Der Züchter*, Berlin, 28(5):237–41, Aug., **1958.** 2 figs., 6 tables. **DA, DLC**—Delayed examination of productive qualities of rees damaged by frost is necessary to determine the real damage. Only with a double examiation it is possible to determine the degree of regeneration capacity of the different sorts of rees damaged by frost. *Subject Heading:* **1. Frost damage to fruit trees.**—*A. V.*

10.8—119 551.525:633.15

Chirkov, Iu. I., **Otsenka uslovii teploobespechennosti kukuruzy v period ot poseva do ziavleniia massovykh vskhodov.** [Evaluation of conditions of heat supply of corn in the eriod from sowing to mass germination.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, o. 47(74):97–100, **1956.** 3 tables. **DLC**—Observations of the temperature regime of the il, carried out in corn fields of "Bol'shevik" Kolkhoz, Moscow Oblast, in 1955, and of the eed of corn development on plots with different heat supply, have shown that sums of soil mperature calculated from 8°C vary very little. Their steadiness indicates that soil temperare above 8° is effective for the germination of corn seeds, and the requirements of corn for armth in the period from sowing to germination are expressed in the effective temperature m equal to 86° on the average. *Subject Headings:* **1. Soil temperature effects on corn 2. orn cultivation 3. Germination 4. Moscow Oblast, U.S.S.R.**—*A.M.P.*

10.8—120 551.524:551.525:631.67

Chudnovskiĭ, A. F., **Energeticheskiĭ metod izucheniia voprosov orosheniia sel'skokhoziaennykh kul'tur.** [Dynamic method of studying irrigation of agricultural crops.] (In: kademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** oscow, **1957.** p. 148–167. 5 figs., 2 tables, 13 refs., 15 eqs.) **DLC** (QC940.R9A6)—An alysis of the results of a three-year field investigation carried out in 1951–1953 by members the VASKBNIL Agrophysical Institute to determine the influence of various irrigation stems on the development of crops. The essence of the "dynamic" method consists of easurement and calculation of the full balance of heat in the soil-air system or in the soil-leaf system, and in the comparison of this balance as a whole, or in parts, with the balance on ld sections which were not subjected to one or the other agrotechnical processes. *Subject adings:* **1. Irrigation effects 2. Soil-air heat exchange.**—*A.M.P.*

10.8—121 551.579.5:551.586:633:633.73(676.2)

Jones, P. A. and Wallis, J. A. N., **Irrigation experiments at the coffee research station, iru, Kenya.** *East African Agricultural Journal*, Kikuyu, Kenya, 22(4):186–187, April

1957. 3 refs. **DLC**—The problems studied are: The timing and frequency of irrigation; th method of placement and quantity of water (related to the distribution over and in the soil) the effect of mulching in relation to irrigation; the addition of farmyard manure and mineral In any irrigation trials, these problems should be assessed by their relation to vegetative growth flowering, crop yield, pests and diseases and the fluctuation of soil mosture and nutrients *Subject Headings:* **1. Irrigation 2. Soil moisture variations 3. Coffee 4. Kenya.**—*A. V.*

FOREST METEOROLOGY AND FIRE WEATHER

See also: **Forest influences on snow accumulation, Europ. U.S.S.R.** (Rakhmanov), 10.8–305; **Topographic effects on forest met.** (MacHaltie), 10.8–344.

10.8—122 551.506:632.187(797

*U. S. Weather Bureau, **Annual fire weather report for Washington, Fire Weather Distric No. 3, season 1956.** Seattle–Tacoma Airport, Seattle, Weather Bureau Airport Station, 195 unpaged. Mostly graphs and charts. **DWB** (M09.584 U587a)—This report summarize weather conditions for year 1956 and compares them with conditions in 1954 and 1955. Th low humidities and rainfall during April, May, July and August are well shown on graphs an charts indicating % departures from normal. Twice as many fires were reported (thoug fewer lightning fires) than is usually the case. Conditions were unusually severe in la spring and late summer. *Subject Headings:* **1. Fire weather reports 2. Severe fire weathe seasons 3. Washington (State).**—*M. R.*

10.8—123 551.509.58:632.18

Wilson, G. U. (*Central Office, Melbourne*), **A capability study of forecasts of maximu temperature, relative humidity, dew point, wind and precipitation in several states with speci application to fire weather requirements.** *Australian Meteorological Magazine,* Melbourn No. 21:31–48, June **1958.** 13 figs., 9 tables, 2 eqs. **DWB**—A study is made of the capabili to forecast several of the elements (maximum temperature, dew point, relative humidit precipitation, wind and thunderstorms) for Coffs Harbour, Mount Burr, Wirrabara a Dwellingup. These stations adjoin or are located in important State forests. The forecasti capability is studied with particular reference to forestry fire weather requirements. Maximu temperature forecasts are generally good and short range (9 hr) forecasts are found to be mo accurate than long range (24 hr) forecasts. A disturbingly high proportion of forecasts fail predict accurately maximum temperature of 90°F or more. Forecasts of dew point and re tive humidity need to be improved. A high percentage of forecasts fail to predict low d points and humidities accurately. The accuracy of 9 hr forecasts is little better than 24 forecasts, at one station the accuracy is worse. Rain and thunderstorm forecasts are n particularly accurate. On 24% of occasions when no rain was forecast for Mount Burr, ra fell at some time during the period of validity of the forecasts. Quantitative wind foreca are analyzed for Coffs Harbour only. The forecasts are generally good but the wind directi is found to be inaccurate on 4 out of the 5 occasions when the wind speed exceeds 16 mph. T success of fire control measures depends on the capability to forecast accurately extremes maximum temperature, dew point and relative humidity. The failure to do this is thought be due to errors in prognosis, particularly incorrect predictions of cyclogenesis. The requi ment for improved techniques to forecast dew point is emphasized. *Subject Headings:* **1. F weather forecasting 2. Forecast accuracy 3. Forecast improvement 4. Australia.**—*Autho abstract.*

INDUSTRIAL METEOROLOGY

See: **Marine forecasting** (Blowers), 10.8–90.

MEDICAL METEOROLOGY

See: **Thallasotherapy texts.** (Haeberlin, Goeters), 10.8–11; **Air pollution surveys, Texas** (Paganini), 10.8–20.

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Vapor pressure charts** (Tunnell), 10.8-13; **Observers' manuals, Chile,** 10.8–33; **Bathythermograph processing manuals** (Richmond), 10.8–34; **Psychrometric tables, U.S.S.R.** (Savich), 10.8–37; **Aerological Networks** (Van Mieghem), 10.8–48.

10.8—124 551.501.4:551.55:629.13

Gringorten, Irving I. (*Geo. Res. Dir., A. F. Cambridge Res. Center, Bedford, Mass.*), **The D plotter.** *Navigation*, Los Angeles, 5(5):231–237, Spring **1957.** 10 figs., 4 refs. **DWB, LC**—This is a device that permits the speedy mechanical addition and subtraction of wind mponents. When wind information is given in terms of direction and velocity, or steamlines d isotachs this plotter can also be used to reduce the labor of plotting. It is used for all air- aft speeds between 150 kn and 500 kn, for tailwinds up to 300 kn and headwinds as great as 0 kn. It is designed for plotting hourly legs of flight, legs of shorter duration or of duration nger than one hour by as much as 35 min. The new design can be used in minimal flight anning, single-heading flight planning, flight plans along great circles, thumb lines or any her fixed track. Its description as well as its operation are given in the paper. *Subject eading:* **1. Wind computers.**—*N.N.*

10.8—125 551.501.724(268)

*Zaĭchikov, P. F., **Rezul'taty aerologicheskikh nabliudeniĭ dreĭfuiushcheĭ stantsii S-4 za emia ekspeditsii 1949 g.** [Results of aerological observations by the S-4 drifting station ıring the 1949 expedition.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, o. 22:100–116, **1957.** 3 tables, ref. **DWB**—The results of aerological observations carried t at a station in the middle of the Arctic Ocean at 81°50′N lat. and 194°00′E long. The servations were made from May 5–12, 1949. The results of the aerological observations are esented in a table which is constructed by beginning with the typical distribution of tempera- re in the troposphere in the drifting region characterized by a layer of cold air (layer No. 1), ove this layer is the isothermal or inversion layer (layer No. 2) extending to 1.5–2 km. ove this layer up to the tropopause the temperatue falls (layer No. 3) with height, but above is (layer No. 4) it rises slightly. Also data for the tropopause (No. 5) and lower stratosphere o. 6) are presented. The greatest stability prevailed in layer No. 2. The greatest tempera- re oscillation (9.2°) was in the ground layer (0–200 m). The relation between turbulence xing and temperature in the various layers is examined. In the inversion and isothermal er up to 1.5–2.0 km, the mean velocity of the downward motion attains 18 cm/sec. With nsition to a positive temperature gradient and increase in its gradient the mean vertical locity increases. An appendix contains the results of the temperature soundings for the rious ascents and the vertical air movement during this expedition. *Subject Headings:* **Upper air observations 2. Upper air temperatures 3. Arctic Ocean.**—*I.L.D.*

10.8—126 551.501.774:551.508.768:551.574.7

Goettelman, R. C. and Poppoff, I. G. (*both, Stanford Res. Inst.*), **Pneumatically actuated ıg detector for stationary operation.** *American Meteorological Society, Bulletin*, 39(11):565–3, Nov. **1958.** 5 figs., 7 refs. **DWB, DLC**—An icing detector which operates on a pressur- d air system and utilizes the pressure drop produced across a Venturi tube as an indication cing conditions is described in this paper. Since the rate of ice formation on a surface is a ction of the configuration of the surface, this detector has the unique advantage of being ptable to conform with the shape of any structure on which it is mounted. Previously eloped icing detectors require either a high velocity air stream, as in aircraft operation, or ving parts subject to possible mechanical failure during severe icing conditions. A pneu- tically actuated icing detector designed specifically for stationary operation would be capable cing measurements without either of these restrictions. Preliminary experiments indicate t this technique is feasible and capable of furnishing quantitative measurements of icing erity. *Subject Headings:* **1. Icing instruments 2. Icing measurement techniques.**—*thors' abstract.*

10.8—127 551.501.774:551.575.2(429.1/.3)

*Stewart, K. H., **Some observations on the composition of fogs.** *Great Britain. Meteorological Research Committee, M.R.P.* 1074, Oct. 28, **1957.** 12 + p. 6 figs., 3 tables, refs., eq **DWB** (M(055) G786m)—Fog drop size measurements were made at Cardington with a cascade impactor and results are summarized in extensive tables and graphs for the several methods for each size-range of drops. This equipment was unreliable for drops $< 10\ \mu$ or for very large drops $> 20\ \mu$ due to evaporation on the one hand and due to inertia effects on the other. For drops of 10–20 μ a sedimentation sampler using simple Napthol Green-coated slides, exposed for a few minutes is as satisfactory as the cascade impactor method and for $> 20\ \mu$ drops it is better. None $> 50\ \mu$ were observed and few from 20–50 μ so the error on the upper end of the spectrum is considered unimportant. Liquid water content is also determined by these methods, but should be increased by a factor of 2 to allow for loss of small droplets. Optical relations and optical methods are also discussed. Difference between coastal and urban fog is noted; applications, future developmental work, and detailed instructions for use of equipment are given. *Subject Headings:* **1. Fog drop size distribution 2. Cascade impactors 3. Fog drop size measurement techniques 4. Cardington, Wales.**—*M.R.*

10.8—128 551.501.75:551.55

*Lally, Vincent E. and Leviton, Robert, **Accuracy of wind determination from the track of falling object.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics* No. 93, March **1958.** 10 p. 3 tables, 21 eqs. **DWB, DLC**—Tables are presented for determining the fall velocities of any object whose "K-value" (which depends on the drag coefficient) is known, at any altitude from 20–75 km. If the fall velocity is determined, then the wind error for wind shears of 0.01 to 0.10 unit/sec can be found, and finally the "K" for any spherical object of a given diameter with no load, or with a 1, 2 or 5 kg load can be determined. If the fall velocity is > 70 mps the errors in wind measurements will be excessively high, even for wind shears of 0.02. Hence a spherical balloon will not be of much use above 60 km (or $>$ 5 km for a 5 m diameter sphere with a 1 kg load). A parachute will be effective up to 70 km (6 km with a 1 kg load) and chaff will provide wind data up to 85 km. Accuracy of ground tracking is not considered. Chaff or parachutes can be released from rockets at any given altitud *Subject Headings:* **1. High level wind measurement techniques 2. Drag effects on wind measurement 3. Falling sphere wind measurement 4. Chaff wind measurement.**—*M.R.*

10.8—129 551.501.81:551.594

Birfel'd, Ia. G., **Radiolokatsionnye otrazheniia ot poliarnykh siianiĭ.** [Radar reflection from auroras.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:543–547, **1957.** 5 figs 5 refs. **DLC** Trans. into English by M. G. Priestley in the English language edition of th **Izvestiia,** *Bulletin of the Academy of Sciences of the U.S.S.R., Geophysics Series*, No. 4:154–15 1957, issued **1957** by American Geophysical Union. **DWB**—Radar reflections from auror were studied with radar having a frequency of about 10 mh Hz for an impulse with length of mc/sec, a thickness of 75 kw in a frequency of recurrence of 50 z. The type of reflections c tained on the radar screen are reproduced and analyzed. In general, the reflections, althou complex, consist of signals having a width of the order of 10 mc/sec corresponding to the leng of the impulse studied. The reflections are associated with solar activity and geomagnetic a ionospheric disturbances produced in the ionosphere. Reflections were observed in all dir tions. *Subject Headings:* **1. Radar echoes from auroras 2. Auroras.**—*I.L.D.*

10.8—130 551.501.81:523.51:551.5

Booker, H. G. and Cohen, Robert (*both, Cornell Univ.*), **A theory of long-duration meteo echoes based on atmospheric turbulence with experimental confirmation.** *Journal of Geophysical Research*, Wash., D. C., 61(4):707–733, Dec. **1956.** 12 figs., table, 21 refs., 47 e (Also in: Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 2, Ionosph Section,** issued **1958.** p. 171–194. 13 figs., 21 refs., 47 eqs.) These proceedings also issued *Journal of Atmospheric and Terrestrial Physics*, London, Special Supplement, 1957, pub. 19 **Discussion** by L. A. Manning and V. R. Eshlemen, *Journal of Geophysical Research*, 62(3):3 371, Sept. **1957. DLC**—The radius of meteor trails is computed for small eddies and for la

ddies. The radius is about 10 m one second after meteor trail formation and increases to 0^4 m after several hundred seconds; at the same, the central electron density decreases with me. The intensity of radio echoes scattered from meteor trails decreases as the cube of the me in the few seconds after larger eddies modify the ionization. After that the echo decay ccurs faster because electrons become attached to air molecules. *Subject Headings:* **1. Meteor ail radio transmission 2. Turbulence in the ionosphere.**—*S. Fritz.*

10.8—131 551.501.81:551.594.5:551.551

Booker, H. G. (*Cornell Univ.*), **Turbulence in the ionosphere with applications to meteor-ails, radio-star scintillation, auroral radar echoes, and other phenomena.** *Journal of Geo-hysical Research*, Wash., D. C., 61(4):673–705, Dec. **1956.** 11 figs., 43 refs., 63 eqs. (Also 1: Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 2, Ionosphere Section,** ssued **1958.** p. 52–81. 11 figs., etc.) These proceedings also issued as *Journal of Atmospheric nd Terrestrial Physics*, London, Special Supplement, 1957, pub. **1958. DLC**—Two scales of urbulence are discussed, since large eddies are responsible for forward scattering phenomena nd small eddies for back-scatter. Molecular diffusion theory forms the basis for small scale ddy formulas; Richardson's number is used for the large scale eddies. Large eddies have time onstants of 40 to 100 seconds; small eddies about 0.4 sec near 100 km. Large eddies have a cale of 1.6 km, small eddies about 1.3 meters. The coefficient of eddy diffusion in meteor ails is less than 10 for small eddies and increases to 10^4 for large eddies. The large eddies esponsible for radio star scintillation are located near 200 km. The turbulence power in att/kg is given as 5×10^{-4} in the troposphere, 25 at the meteoric level and 1000 at the scintil-tion level. *Subject Headings:* **1. Turbulence in the ionosphere 2. Meteor trail radio ransmission 3. Radio star scintillation 4. Radar echoes from auroras 5. Auroras.**—*. Fritz.*

10.8—132 551.501.81:551.510.62

Jones, R. F. (*Met. Office, London*), **Radar echoes from atmospheric inhomogeneities.** *oyal Meteorological Society, Quarterly Journal*, 84(362):437–442, Oct. **1958.** 2 tables, 9 refs., 4 eqs. **DWB, DLC**—The possibility that radar echoes from atmospheric inhomogeneities are ne explanation of echoes received in conditions which made it certain they are not received om precipitation elements ("angel" echoes) is examined quantitatively. It is shown that ich an explanation is theoretically possible but that the required refractive index changes are rge, involving changes of a few mb in vapor pressure and/or a few degrees C in temperature a distance of about 25 cm. Reflection of the main or side-lobe energy at a limited quasi-orizontal surface is shown to give the most likely meteorological explanation, but the inability measure changes of refractive index in the free atmosphere to the required accuracy prevents sitive confirmation. *Subject Heading:* **1. Radar echoes from atmospheric inhomogeneities.**—*uthor's abstract.*

10.8—133 551.501.81:551.576.4:551.515.4

Kolokolov, V. P., **Radarnye kharakteristiki oblaka i grozovaia deiatel'nost'.** [Radar aracteristics of clouds and thunderstorm activity.] *Leningrad. Glavnaia Geofizicheskaia bservatoriia, Trudy*, No. 67(129):129–130, **1957.** table, 2 refs. **DWB**—The author attempted determine the minimum height to which the top of a radar cloud must rise in order that it come a thunderstorm cloud. In 8 cases of radar study of thunderstorm clouds, the mean ight of the tops of the radar clouds was greater than 5600 m above the earth's surface; in 4 cases shower clouds without thunder, the tops of radar clouds had a mean height of 3700 m. The an height of top of radar clouds above the zero isotherm is greater than 2650 m while the rresponding height for a shower cloud is 875 m. Hence a radar cloud becomes an active understorm cloud only when the radar top attains a minimum height above the level of the ro isotherm. *Subject Headings:* **1. Radar observation of clouds 2. Cloud top height 3. hunderstorm activity.**—*I.L.D.*

10.8—134 551.501.81:778.534.3

Ligda, Myron G. H. and Sullivan, James D. (*Dept. of Oceanog. and Met., Texas A. & M. llege*), **Photographic techniques in radar meteorology.** *Photographic Science and Engineering,*

2(1):1–5, June **1958.** 5 figs., 5 refs.—Photographic recording techniques have been devised for radar meteorological observations which make possible the detection of transient echoes from lightning discharges, flash-flood-producing storms, and the horizontal distribution of precipitation in different layers of the atmosphere, etc. Such diverse techniques as time lapse, time exposure, high-speed continuous strip, image addition and subtraction, color, and rapid process photography have been employed effectively and are described. *Subject Headings:* **1. Radar scope photography 2. Time lapse photography.**—*Authors' abstract.*

10.8—135 551.501.81:551.594.21

Ligda, Myron G. H. (*Dept. of Oceanography, Texas A. & M. College*), **Radar detection of lightning.** Reprinted from the C and E Digest, House organ of the USAF Air Defense Command, Oct. **1955,** p. 12–14, 3 figs.—Several radarscope photographs show lightning echoes, some of which would be hard to distinguish from other echoes without supplementary evidence. Only about 1 in 10 or 20 scans will reveal lightning echoes, but they may be observed at ranges up to 100 mi and often when clouds or precipitation would prevent visual observation. Echoes up to 60 mi in length and with remarkable forking have been detected. Best band is the L-band (23 cm) because it is high powered and sensitive and penetrates precipitation fairly well. *Subject Headings:* **1. Radar echoes from lightning 2. Lightning detection by radar.**—*M.R.*

10.8—136 551.501.81:551.577

Shupiatskiĭ, A. B., **Radiolokatsionnoe issledovanie osadkov po metodu etalonnoĭ tseli.** [Radio location studies of precipitation using standard targets.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy,* No. 22:89–95, **1957.** 3 figs., 5 refs., 9 eqs. **DWB**—The author describes a method for increasing the accuracy of determination of rainfall echoes reflected on radar screens. It is based upon the principle that, if a rainfall echo signal is rapidly compared with a signal from a standard target, it is possible to estimate with sufficient accuracy the strength of the reflected signal from the rainfall since the instability of the radar parameters influences equally both signals. The standard signal used was an angular reflector. The equation for computing the signal reflected by rain received by the radar screen, the intensity of the energy reflected by unit target from the effective surface, the effective surface of the angular reflector and the magnitude of the echo signal are developed. A comparison of intensity of rainfall recorded by radar and by pluviograph shows that for intensities up 0.1–0.12 mm/min (6–7 mm/hour) the radar measurements are high, but by introducing suitable corrections the method developed can yield reliable results. Also a vertical section of the precipitation zone can be obtained with this method. *Subject Headings:* **1. Radar precipitation echoes 2. Rainfall intensities.**—*I.L.D.*

OBSERVATIONAL DATA

See also: **Geomagnetic yearbooks, Kew Obs.,** 10.8–14; **Station description catalogs, Spain,** 10.8–17; **IPY history** (Gerson), 10.8–43; **IGY program** (Marshack), 10.8–44; **Soviet IGY activities** (Zalemaev), 10.8–46; **IGY upper atmos. program** (Ben'kova), 10.8–47; **U. S. and Soviet IGY Antarctic expeds.** (Laktionov), 10.8–60; **Ice breakup data, Lena River** (Chistiakov), 10.8–101; **Severe fire weather seasons, Washington State** (U. S. W. B.), 10.8–122.

10.8—137 551.506:551.510.62(43

*Bean, Bradford R. and Ozanich, A. M., **Climatic charts of the surface refractivity for Germany.** *U. S. National Bureau of Standards, NBS Report,* No. 5588, July 9, **1958.** 8 p. 66 figs., 2 tables, 9 refs. **DWB** (621.384 B367cL)—The significant role of meteorological data used in the prediction of radio field strengths at frequencies of 50 Mc and above is recognized. Radiosonde measurements have been used in the description of the effect of elevated super refractive layers. In this report of climatic charts of the surface refractivity for Germany eight weather stations submitted their meteorological data for this investigation from which values of the maximum annual range of monthly means were studied. A comparison of the annual and diurnal ranges of N_0 in Germany is made with those from six U. S. weather stations. Figures are much higher in the U. S. *Subject Headings:* **1. Radio field strength 2. Refractive index calculation 3. Climatic data 4. Germany.**—*N.N.*

10.8—138 551.506:551.582

Booth, R. E. (*Met. Office, Harrow*), **Looking back on 1957.** *Weather*, London, 13(5):157–160, May **1958. DWB**—The author reviews month by month the weather in the British Isles during 1957 and world weather for the same period. In the British Isles the mild weather of Dec. 1956 and of Jan. and Feb. 1957 produced the mildest winter in seven years. Spring began unusually mild but May was below average in temperature. The general rainfall was the lowest since 1896. June temperatures attained the highest records since 1856 and July and August were marked by unusual rainfall. Sept. was inclement, Oct. mild and mainly dry, November was stormy and Dec. was sunny. Over most of Europe temperature was above normal during Jan.–March, but in eastern Canada and the U. S. it was colder than usual in Jan., warmer than usual in Feb. April and May were generally dry in Europe but wet in southern U. S. and the Central States, temperature was below average in Europe. June, July and Aug. were dry in eastern North America, rainfall was below average over most of Northern Hemisphere except in southern Europe and Central U. S. Sept. was colder than usual over most of the northwest and Central Europe, Canada and U. S., and warmer than usual in the Canadian Rockies and European Russia. Quantitative data on temperatures and rainfall are given in the text. *Subject Headings:* **1. World weather summary for 1957 2. Weather in 1957.**—*I.L.D.*

10.8—139 551.506:551.524.36(421)

†Hoyt, Joseph B., (*New Haven Teachers College*), **The cold summer of 1816.** *American Association of Geographers, Annals*, 48(2):118–131, June **1958.** 6 figs., table, about 70 foot-refs. **DWB, DLC**—Excerpts from the diaries, editorials and weather records of New England and New York for 1816 are cited to illustrate many features of the tragic series of cold waves which occurred in northeastern U. S. and in northwest Europe in May, June, July, Aug. and Sept. 1816. The following year was also very cold (in the mean) and as a result of this cold and accompanying drought there were large migrations from New England to "more favorable" regions to the south and west. Corn crops were ruined several times in the summer of 1816, and hay and fodder were very scarce. Causes are attributed to (1) unusual sunspot activity resulting in great variability and hence frequent cold waves, and (2) volcanic activity producing reduced average temperature. Graphs show day to day variations in temperature at 4 New England stations (May–Sept. 1816) and at London, Eng. *Subject Headings:* **1. Cold summer, 1816 2. Historic weather records 3. New England 4. London, Eng.**—*M.R.*

10.8—140 551.506:551.510.535

Knecht, R. W. (*Natl. Bur. of Standards, Boulder, Colo.*), **Statistical results and their shortcomings concerning the ionosphere within the auroral zone.** In:Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 2, Ionosphere Section.** N. Y., Pergamon Press, **1958.** p. 109–119. 20 figs., 3 refs. **DWB.** Also issued in: *Journal of Atmospheric and Terrestrial Physics*, London, Special Supplement, Pt. 2, 1957, publ. **1958.** p. 109–119. 20 figs., 3 refs. **DLC**—This report is on the results obtained from the Canadian and Alaskan chain, and the stations in Greenland and Iceland and at Kiruna, Sweden. It urges all networks to accept the procedures and recommendations that were outlined in the URSI High Latitude Committee's report. No additional time is necessary for any data reductions, nor is the job of scaling a day's ionograms any longer arduous. Rather, the complete job—including F-plot—is done in only 2 hrs. Recommendations to make statistical summaries of high latitude ionospheric data more interesting and meaningful are as follows: the intervals making the sounding; the gain run; the preparations of F-plot, and on what to publish in addition to the meridian. *Subject Headings:* **1. Ionograms 2. Ionospheric data reporting 3. Auroral zone.**—*N.N.*

10.8—141 551.506(85)

Raimondi, Antonio and Paz Soldan, Manuel Rouat, **Notas historicas sobre meteorología peruana.** [Historical notes on Peruvian meteorology.] *Revista Meteorologica del Peru*, Lima, 3(6):35–50, **1957.** tables. **DWB**—From a historic monograph on the weather in Peru, new passages and data tabulations are reproduced concerning rainfall amount in Lima pressure and temperature measurements, altimetry, etc. The data presented include a complete tabu-

lation of four times daily amounts of pressure, temp. and humidity in Lima every day in April 1869. The other data are pressure, temp. and rainfall values for isolated periods between 1823 and 1867. *Subject Headings:* **1. Historic weather records 2. Peru.**—*G.T.*

10.8—142 551.506.1:551.582.2(99)

*Harlin, Ben W. (*U.S.W.B.*), **Little America (Inside Antarctica, No. 1).** *Weatherwise*, Boston, 11(4):116–123, Aug. **1958.** 5 photos, 4 tables. **DWB**—A detailed account of the station operations and month-by-month weather at Little America during 1957. Instrumental equipment is listed and illustrated and a monthly summary of average, extreme and frequency data for usual weather elements given for Feb.-Nov. 1957 incl., for Little America Station. Snow stake readings at 4 places at 12 times during the year, snow density data and wind accompanying it for new snow during winter, and pressure data for each month are also tabulated. *Subject Headings:* **1. Climatic data 2. Climate of Little America 3. Little America.**—*M.R.*

10.8—143 551.506.1:551.582.2(52)

*Japan. Meteorological Agency, Tokyo, **Climatic records of Japan and the Far East Area: monthly mean relative humidity, monthly total sunshine.** Tokyo, March **1958.**—The third volume in this series contains monthly data for each year of record for mean relative humidity and total sunshine for about 300 stations in Japan, China, Formosa, Korea, the Western Pacific Islands, Bonin Islands, Ryukyus, Kuriles and S. Sakhalin, from earliest record (1886 or later) through 1952. (*See* 9.3–19 March 1958, *MAB*, for similar title, **Mean daily maximum temperatures, mean daily minimum temperatures** and 6.10-241, Oct. 1955 for **Mean pressure, temperature and precipitation data.**) *Subject Headings:* **1. Climatic data for Japan 2. Mean relative humidity data 3. Sunshine data 4. Japan. I. Saito, Ren'ichi II. Wadati, Kiyoo.**—*M.R.*

10.8—144 551.506.5(988):551.589.1

§*Hamilton, R. A. (*Met. Office, Prestwick*), **The meteorology of North Greenland during the midwinter period.** *Royal Meteorological Society, Quarterly Journal*, 84(362):355–374, Oct. **1958.** 14 figs., 10 tables, 8 refs. Also: Fleagle, R. G.; Jefferson, G. J., Manley, G. et al. **[Discussion of] R. A. Hamilton: The meteorology of North Greenland. . . and (Reply by Hamilton).** *Ibid.*, 85(364):176–178, April **1959. DWB, DLC**—Data for 2 stations on the North Greenland Ice Cap and coast for Dec. and Jan. 1952–53, and Dec.–Jan. 1953–54 are analyzed in detail and presented in tables, mean monthly, or synoptic circulation charts. Paper includes detailed synoptic type studies, frequency (and examples) of frontal activity, weather associated with pressure systems, surface wind flow and calms, temperature conditions, visibility and drifting snow vs. wind speed, compiled between midwinter of 1952–53 and 1953–54 and with other years at other stations at Northice (78°4′N, 38°29′W, 2343 m) and Britannia Sø (77°09′N, 23°26′W; 229 m). Disturbances affect North Greenland about 15 times a month but few cause precipitation. Highest temperature was −18°C and lowest −66°C (on the ice sheet). *Subject Headings:* **1. Climate and weather of North Greenland 2. Synoptic types of North Greenland 3. Greenland Ice Cap 4. Northice, Greenland 5. Britannia Sø, Greenland.**—*M.R.*

INSTRUMENT CARRIERS

See also: **Hist. of aerology** (Van Mieghem), 10.8–48; **Rockoons, Arctic,** 10.8–54; **Space science bibliogs.** (Benton), 10.8–75; **Earth satellite data, 1958 Epsilon,** 10.8–91; **Satellite observatories** (Dryden), 10.8–93; **Soviet satellite Delta 2, 1958** (Hergenhahn), 10.8–94; **Ionospheric radio wave prop. anomalies** (Kitchen, Joy), 10.8–95; **Tower obs.** (Gill), 10.8–152; **Rocket meas. of night airglow** (Tousey), 10.8–244; **Missile photog.** (Duntley), 10.8–348.

10.8—145 551.507.2

Bascom, Willard (*Nat. Res. Council, Wash., D. C.*), **Deep-sea moored buoy instrument stations.** *National Research Council, Wash., D. C., Publication*, No. 473:105–111, **1957.** 3 figs. **DWB** (551.46 M277pr), **DLC** (GC57.N33, 1956)—A number of possible uses for deep-moored

buoys are examined. Among the many applications discussed are the following: the collection and recording or telemetering of meteorological data and the reception of wind and wave information during a passing storm. *Subject Heading:* **1. Buoy weather stations.**—*N.N.*

10.8—146 621.396.663:551.507.321

Giles, Keith C. and Peterson, Roy E. (*both, General Mills*), **Accuracy of RDF position fixes in tracking constant level balloons.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 107, October **1958.** 11 p. 3 figs., 6 tables **DWB, DLC**—Based on series of constant pressure balloon flights that included concurrent tracking by standard radio direction finding techniques and by camera techniques (which provided an accurate standard of true position), it has been possible to determine the distribution of errors in a significant sample of RDF fixes as made by networks manned by two different agencies. The comprehensive study of RDF fix error which is presented provides a sound basis for the use of such data. *Subject Headings:* **1. Radio direction finding errors 2. Constant level balloon tracking errors. I. Widger, William K., Jr.** (*ed.*).—*Authors' abstract.*

10.8—147 551.507.321.2

*Angell, James K., **Transosonde flights for Sept., Oct. and Nov. 1957.** Wash., D. C., Weather Bureau, Jan. **1958.** 9 p. 34 figs., 2 tables, ref. **DWB** (551.507.321.2 U587tr)—This paper illustrates and discusses the routine 300 mb transosonde flights that were initiated from Iwakuni, Japan, in the summer of 1957 under the auspices of the U. S. Navy. Such flights were made for the three "fall" months of Sept. through Nov. The transosondes are positioned, when possible, at two-hourly intervals by means of Navy radio direction finding (RDF) stations while west of 135°W, and by Federal Communications Commission (FCC) RDF stations while east of this longitude. These positions are placed on the meteorological teletypewriter circuits in Pearl Harbor and Norfolk for transmission to analysis centers. Such positions constitute the basic data from which wind velocities and derived quantities may be computed on a routine basis. The transosondes provide abundant data for research purposes and the means whereby 300 mb analyses over the oceans may be improved. As the tracking and communications networks continue to improve, the utility of these flights for both practical and research purposes will become even more apparent. *Subject Heading:* **1. Transosonde flights.**—*N.N.*

10.8—148 551.507.321.2

Raven Industries, Inc., Sioux Falls, South Dakota, **Balloon flight with top-mounted load.** Contract Nonr 2215(00), Final Report (on) Project 102, Oct. 19, 1956. 9 p. 13 figs. (incl. photos), map, graph. **DWB** (M07.321.2 R253f)—On Sept. 24, 1956 a Skyhook balloon with a spectrograph and power supply mounted on top of the balloon was released from Parker, S. Dakota, ascended to 105,000 ft where it floated for 8 hrs toward the N.W. and was terminated over Huron, S. D. The instruments parachuted to the ground and were found near Huron. The top load was 36 pounds and the bottom load was 56 pounds. Specifications for instruments and balloon, inflation techniques, launching, tracking, recovery and results are outlined in this report; the various activities and components illustrated by numerous photographs and the trajectory shown on a detailed map of the region. *Subject Headings:* **1. Skyhook balloon soundings 2. Top-loaded balloon techniques 3. Spectrograph observations from balloons. I. Tory, Farnham S.**—*M.R.*

10.8—149 551.507.321.2:551.551:533.6.63

Sinha, K. L. (*Meteorological Office, Jodhpur*), **Calculation of the coefficient of aerodynamic resistance of pilot balloons from the empirical formula used for computing their rate of ascent.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 9(1):47–50, Jan. **1958.** fig., 2 tables, 7 refs., 6 eqs. **DWB, DLC**—The empirical formula $V = C.F^{\frac{1}{3}} (W + F)^{\frac{1}{3}}$ is used by the India Meteorological Service to compute the uniform rate of ascent of pilot balloons (V—uniform rate of ascent, F—free lift weight, W—weight of the balloon and C—constant). An attempt is made to determine the value of the coefficient of the aerodynamic resistance as obtainable from this empirical equation. In the case of a spherical balloon of diameter d, the

aerodynamic resistance is given by $R = k\rho d^2 V^2$, where k—coefficient of aerodynamic resistance, which decreases with increasing Reynolds numbers and remains constant after 3×10^5 for pilot balloon data. In terms of free lift, the coefficient of aerodynamic resistance k or f $(dV/\gamma) = F_0(\rho d^2 V^2)$. V—is evaluated from the empirical equation and C from data in free lift tables. The applicability of the formula at a particular Reynolds number is illustrated and data for the evaluation of the coefficient of aerodynamic resistance are presented in a table. *Subject Headings:* **1. Pilot balloon ascension rates 2. Aerodynamic properties of balloons.**—*I.L.D.*

INSTRUMENTS

See also: **Bathythermograph processing manuals** (Richmond), 10.8–34; **Icing detector** (Goettelman, Poppoff), 10.8–126; **Solar radiation data, Portugal** (Morais), 10.8–234; **Solar radiation data, Florida and Michigan** (Sihvonen et al.), 10.8–235; **High alt. radiosonde flights, N. America and Greenland** (Lowenthal, Arnold), 10.8–247.

10.8—150 551.508.54:551.558(782)

*Businger, J. A. and Suomi, V. E. (*both, Dept. of Meteorology, Univ. of Wisc., Madison, Wisc.*), **Variance spectra of the vertical wind component derived from observations with the sonic anemometer at O'Neill, Nebraska in 1953.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):415–425, **1958.** 5 figs., table, 6 refs., 4 eqs. German and French summaries p. 415. **DWB, DLC**—An analog data reduction system for obtaining variance spectra of stationary time series is described and its accuracy is discussed. This equipment was developed to reduce data obtained with the sonic anemometer. The variance spectra of the vertical wind component observed with the sonic anemometer in 1953 at O'Neill, Neb., are presented in Table 1. *Subject Headings:* **1. Sonic anemometers 2. Vertical wind velocity measurement 3. O'Neill, Nebr.**—*Authors' summary.*

10.8—151 551.508.54

Cramer, H. E.; Gill, G. C. and Record, F. A., **Standard cup anemometers—Massachusetts Institute of Technology.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:145–148. 2 figs., 2 tables, 2 refs.) **DWB**—The characteristics (dimension, rotation rate, recording arrangement, mounting, etc.) of the standard cup anemometers used by the U. S. Weather Bureau are described briefly. Their calibration, which is given by the equation: $V = 0.538 + 0.507N$ (where V is the mean wind speed in m/sec and N—its number of controls per minute) is outlined. The data which are based on 157 hours of chart records are presented in Vol. 2. A table giving the results of field matching tests of standard 3-cup anemometers at O'Neill and photographs of the tower instrumentation are presented. *Subject Heading:* **1. Cup anemometers.**—*I.L.D.*

10.8—152 551.508.54:551.507.7

Gill, G. C. (*Univ. of Michigan*), **Mast profile instrumentation for statistics of wind fluctuations.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:228–232. table, 2 refs.) **DWB**—After discussing the response characteristics of wind instruments which are specified in terms of response to a true sinusoidal fluctuation, the author describes the wind measuring fast response instruments developed by the groups participating in the Great Plains Turbulence Field Program. These include the MIT instrumentation which measured the complete wind vector at a point in space by means of a heated thermocouple type of anemometer and a bi-directional wind vane; the sonic anemometer developed by SUOMI; the Rotating Pressure Tube Anemometer, and the Argonne Electronic Vane. *Subject Headings:* **1. Wind instruments 2. Tower observations**—*I.L.D.*

10.8—153 551.508.54:533.6.0

Gill, G. C., (*Univ. of Mich., Ann Arbor*), **Wind tunnel for anemometer calibrations—Massachusetts Institute of Technology.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*) **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **197.** Vol. 1:149–151. figs., ref.) **DWB**—A description of the MIT wind tunnel (Round Hill Field Station) which

vas dismantled and used in the Great Plains Turbulence Field Program at O'Neill and its operation, the determination of the uniformity of air flow within the working section of the wind tunnel and its calibration are presented with the aid of photographs and graphs of velocity profiles. *Subject Headings:* **1. Wind tunnels 2. Anemometer calibration.**—*I.L.D.*

10.8—154 551.508.54

Glaser, A. H., **Rotating pressure tube—Agricultural and Mechanical College of Texas.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:248–255. 4 figs., 3 refs., 11 eqs.) **DWB**—The theoretical principles underlying the use of a rotating pressure tube cylinder to measure wind fluctuations are presented. These include a mathematical analysis of some aerodynamic properties of the cylinder such as the pressure distribution about the cylinder in the case of nonviscous irrotational flow, the pressure and wind analysis of a rotating pressure tube, the obtaining of wind velocity, the effect of cross wind, etc. The construction of the rotating pressure tube anemometer, its circuity operation and calibration are described. *Subject Headings:* **1. Wind fluctuation measurement 2. Rotating pressure tube anemometers.**—*I.L.D.*

10.8—155 551.508.54

Halstead, M. H. (*A. & Mech. College of Texas*), **Semi-cylindrical anemometers—Johns Hopkins University.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:134–135. 2 figs.) **DWB**—A description with the aid of a diagram and a photograph of the properties and the mounting of semicylindrical anemometers which are more sensitive to wind at heights below 40 cm above the ground than the modified soil conservation anemometers. The results of measurements are presented in Vol. 2. *Subject Heading:* **1. Semicylindrical anemometers.**—*I.L.D.*

10.8—156 551.508.54

Halstead, M. H. (*A. & Mech. College of Texas*), **Wind profile instrumentation.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** Vol. 1:126–127. table). **DWB**—The author discusses the error in the cup anemometer arising from the aerodynamic and frictional characteristics of the instrument, and the systematic error introduced by the fact that the fluctuations vary with height. A comparison of anemometers from different institutions carried out at O'Neill, indicated a difference of about 6% among readings (data given in a table). This variability is in part due to the rather short time interval during which comparison was made. A study of wind profiles in order to eliminate the error indicates that the difference among the anemometers was only .5% as compared with the tolerable difference of $\pm$ 3%. *Subject Headings:* **1. Wind profile measurements 2. Cup anemometers 3. O'Neill, Nebr.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Synoptic case histories, Gt. Brit.** (Taylor, Yates), 10.8–29; **Synoptic lab. atlas, U.S.S.R.,** 10.8–36; **Num. pred. texts.** (Bagrov, Morskoĭ, *eds.*), 10.8–38; **Arctic met. and jet stream** (Reed), 10.8–56; **Num. forecast. conf.** (Belousov), 10.8–68; **Marine forecast.** (Blowers), 10.8–90; **River ice forecast.** (Shuliakovskiĭ), 10.8–99; **Local forecast studies, Portland Internat'l. Airport, Ore.,** 10.8–113; **Improved fire weather forecast., Australia** (Wilson), 10.8–123; **Statistics and analog classif.** (Andreoletti), 10.8–208; **Nongeostrophic wind approx.** (Berkofsky), 10.8–209; **Linear equations** (Edelmann), 10.8–211; **Wind divergence** (Hinkelmann), 10.8–212; **Thunderstorm formation, W. Bengal** (Koteswaram, Srinivasam), 10.8–226; **Wind deviation** (Solberg), 10.8–264; **Hailstone forecast. and structure** (Venkateswara Rao, Mukherjee), 10.8–312.

10.8—157 551.509.313

Kibel', I. A., **Vydelenie geostroficheskogo dvizheniia pri prognoze pogody.** [Geostrophic motion in weather forecasting.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 60:3–9, **1957.** ref., 24 eqs. **DWB** (M(055) U581tts)—Short range forecasting methods are based upon the hypothesis of quasistationary state and quasigeostrophic motion. Basically the problem

is reduced to determining future values of the geopotential H; by retaining the hypothesis of quasistationary state and rejecting that of quasigeostrophicity, a system of three equations is obtained for determining H and also the projection of velocity along the horizontal axis of

$$\frac{du}{dt} - \frac{\zeta^2}{c^2}\frac{\partial u}{\partial \zeta}\frac{d}{dt}\left(\frac{\partial H}{\partial \zeta}\right) = -\frac{\partial H}{\partial x} + lv$$

$$\frac{dv}{dt} - \frac{\zeta^2}{c^2}\frac{\partial v}{\partial \zeta}\frac{d}{dt}\left(\frac{\partial H}{\partial \zeta}\right) - \frac{\partial H}{\partial x} - lu$$

$$\frac{\partial}{\partial \zeta}\left[\zeta^2 \frac{d}{dt}\left(\frac{\partial H}{\partial \zeta}\right)\right] = C^2\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right).$$

Independent variables comprise the horizontal coordinates X and Y, the reduced pressure $\zeta = \frac{p}{P}$ (p—pressure, P—standard pressure at sea level) and the time t; l—Coriolis parameter; $C^2 = RT$; R—gas constant, T—mean temperature $\theta = \frac{(\gamma - \gamma)R}{g}$ (g—acceleration of gravity, γ—mean vertical temperature gradient, γa—adiabatic gradient).

$$\frac{d}{dt} = \frac{\partial}{\partial t} - u\frac{\partial}{\partial x} + v\frac{\partial}{\partial y}.$$

On the assumption of a small velocity when these equations can be linearized in relation to the equilibrium state ($u = v = 0$, $H = \bar{H}(\zeta)$), it can be shown that for any initial values of velocities $u_0, v_0, u_1 v_1$ motions rapidly approach the geostrophic. The stationary state of the limiting function $H\alpha$ and the field of velocity, indicate that the linear problem cannot embrace the evolution of the process, so that time scales can be substantially different for the process of evolution and for the process of adaptation of motion to the geostrophic. The adaptation of the motion to the geostrophic in the nonlinear case and the nature of the gradual evolution of meteorological elements are analyzed mathematically and the validity of the quasigeostrophic method of forecasting is demonstrated. *Subject Headings:* **1. Numerical forecasting techniques 2. Geostrophic equations.**—*I.L.D.*

10.8—158 551.509.313

Knighting, E. (*Met. Office, Dunstable*), **Numerical weather forecasting.** *Weather* London, 13(2):39–50, Feb. **1958.** 4 figs. (incl. photo), 2 eqs. **DWB**—A rather thorough discussion of the theory and practice of numerical weather prediction by use of computers: the methods of formulating the problem, integration of the barotropic equations of geostrophic motion, introduction of refinements, objective analysis (machine plotting and analysis of data), errors due to grid length, time intervals and relation of wind speeds to space-time intervals, to boundary values, to truncation errors, etc. Future possibilities are summed up. *Subject Heading:* **1. Numerical forecasting.**—*M.R.*

10.8—159 551.509.313

Kuo, H. L. and Nordö, Jack, **Integration of four-level prognostic equations over the hemisphere.** Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-2242, Scientific Report No. 2, July **1958.** 34 p. 8 figs., 4 refs. 34 eqs.—The three-dimensional, quasi-nondivergent prognostic equation derived previously by Kuo is integrated over the hemisphere, the vertical distribution being represented by four levels. The effects of the mean radiational heating, friction and heating from the ground, and that of turbulent diffusion have been included in this investigation. The initial disturbance considered is a random combination of ten wave components in x and seven wave components in y. The result of the integration is that at the end of the fourth day at 850 mb, three closed lows have been formed all around latitude 60°, while the pole is occupied by a high. These lows have the dimension of the semipermanent lows in winter. *Subject Headings:* **1. Numerical forecasting technique 2. Four-level prognostic equations.**—*Authors' abstract.*

10.8—160 551.509.313:551.515.23

Magata, M. (*Met. Research Institute*), **On the truncation errors in numerical prediction.** *Papers in Meteorology and Geophysics*, Tokyo, 8(2):133–143, July **1957.** 9 figs., 2 refs., 41 eqs. **DWB**—The behavior of the truncation errors in the numerical prediction using grid points is discussed, taking into account the scale of the perturbations. When we forecast by the ordinary numerical prediction method the path of the relatively small cyclone such as the typhoon, the velocity of the center is known to become smaller than the observed value. We conclude that this fact can be explained by the behavior of truncation errors. *Subject Headings:* **1. Truncation error 2. Numerical typhoon forecasting.**—*Author's abstract.*

10.8—161 551.509.313:551.515.23

Masuda, Y. (*Meteorological Research Inst., Tokyo*), **The barotropic forecast of typhoon movement by making use of stream function.** *Meteorological Society of Japan, Tokyo, Journal*, 36(2):55–58, April **1958.** 5 figs., 2 refs. **DWB, DLC**—A test of the barotropic forecast of typhoon movement at the 700 mb level is made. In this problem the stream function, obtained by solving the balance equation, is used in place of the geopotential. In spite of a relatively small prediction area, the results of the numerical prediction of typhoon movement are fairly successful. *Subject Headings:* **1. Barotropic models 2. Numerical typhoon forecasting 3. Stream functions.**—*Author's abstract.*

10.8—162 551.509.313:551.511.3:551.543

Monin, A. S., **Izmeneniia davleniia v baroklinnoĭ atmosfere.** [Pressure changes in a baroclinic atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz*, No. 4:497–514, April **1958. DLC**—The author reviews the fundamental ideas of contemporary theory on the variation of atmospheric pressure in a baroclinic atmosphere with a constant parameter of baroclinicity. The discussion includes the following: the equation of dynamics of the atmosphere in the quasigeostrophic approximations, the introduction of dimensionless magnitudes into the equations of the dynamics of a baroclinic atmosphere, the derivation of the equation of pressure change, the conditions of origin of rapid waves, the adaptation of pressure field to the wind field, quasigeostrophic expansion and the quasigeostrophic approximation. A number of new formulas and conclusions regarding three dimensional disturbance in the geostrophic wind field are presented. *Subject Headings:* **1. Pressure variations 2. Baroclinic models.**—*Author's summary and I.L.D.*

10.8—163 551.509.313

Obukhov, A. M., **O tochnosti predvychisleniia advektivnykh izmeneniĭ poleĭ pri chislennom prognoze pogody.** [Accuracy of precalculated advective field changes in numerical weather forecasting.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, 9:1133–1141, **1957.** 2 figs., 11 refs., 29 + eqs. **DWB.** Trans. into English by A. Nurklik issued as *Canada. Meteorological Branch, Meteorological Transactions*, No. 1:20–29, Jan. **1959.**—The nature of the errors involved in numerical forecasting of pressure fields is summarized briefly. In this study the author examines only the errors associated with the replacement of spatial derivatives along coordinates by corresponding finite differences, using the simplest model in which the changes in field have an advective character. For the sake of simplicity it is assumed that a certain magnitude S (temperature, pressure field, etc.)—is determined on an infinite straight line, $\alpha < x < +\alpha$, but in the case of numerical solution it is given in the intersections of an exact grid $x_k = kh$, where h—magnitude of a space of the grid and k is any whole number. The equation $\frac{\partial S}{\partial t} = -u\frac{\partial S}{\partial x}$ solved on the form of the corresponding differential difference equation $\frac{\partial S_k}{\partial t} = \frac{u}{2h}(S_{k-1} - S_{k+1})$ for the initial condition $S_k(0) = F(x_k)$. The solution of the difference equation in the general form and for the specific example of a "moving front" is presented and the magnitude and nature of the corresponding errors are explained with the aid of graphs. Also the problem of the introduction of smoothed fields into the computation operation is discussed. *Subject Heading:* **1. Numerical forecast errors.**—*Authors summary and I.L.D.*

10.8—164 551.509.313

Ogura, Yoshimitsu (*Johns Hopkins Univ.*), **On the truncation error which arises from the use of finite differences in the Laplacian operator.** *Journal of Meteorology*, Boston, 15(5):475–480, Oct. **1958.** 3 figs., table, 4 refs., 21 eqs. **DWB, DLC**—the modification of the power spectrum for the Laplacian of a variable, associated with the use of finite differences instead of derivatives, is discussed for an isotropic scalar field. The results permit one to specify a finite difference scheme which reduces considerably the systematic truncation error in the Laplacian operator. *Subject Heading:* **1. Truncation error.**—*Author's abstract.*

10.8—165 551.509.313:551.511.32

Platzman, George W. (*Univ. of Chicago*), **The lattice structure of the finite-difference primitive and vorticity equations.** *Monthly Weather Review*, Wash., D. C., 86(8):285–292, Aug. **1958.** 4 figs., 7 refs., 6 eqs. **DWB, DLC**—The use of central differences on a rectangular net, in solving the primitive or vorticity equations, produces solutions on each of two lattices. By exploring this lattice structure, a formal equivalence is established between the central-difference vorticity and primitive equations. A demonstration is given also that exponential instability, previously found to result from certain types of boundary conditions, is suppressed by applying these conditions in such a way as to avoid coupling the lattices. *Subject Headings:* **1. Vorticity equations 2. Numerical forecasting techniques.**—*Author's abstract.*

10.8—166 551.509.313

Reiser, H., **Über das Verhalten der Verfahrens- und Abrundungsfehler bei der numerischen Integration der barotropen Vorticitygleichung.** [Behavior of truncation errors and rounding off in numerical integration of the barotropic vorticity equation.] *Frankfurt a.M. Universität. Meteorologisch-Geophysikalisches Institut, Bericht*, No. 6:69–72, **1956.** 8 eqs. **DWB?**—In order to obtain an idea of the truncation error which arises in the course of numerical integration during the transition from no differential quotients to difference quotients, a comparison is made between the general solutions of the linearized barotropic vorticity equation under the assumption of a fundamental flow u independent of x, y

$$\frac{\partial \nabla^2 L}{\partial t} + u \frac{\partial \nabla^2}{\partial x}\phi = 0, \quad f = 2\,\Omega \sin L = \text{const.}$$

These solutions are for a continuous analytical computation and numerical computation with finite mesh distances $\Delta x = u$, $\Delta t = \tau$. The general solution of the difference equation corresponding to this equation when $M = 2q + 1$ is

$$\phi_{m1n} = a_0 + \sum_{v=1}^{\Sigma^0} \{a_v \cos vk(m\mu - C_v n\tau + b_v \sin vk(m\mu - C_v n\tau) + a_v' \cos vk(m\mu - C_v' n\tau) + b_v' \sin vk(m\mu - C_v' n\tau\}.$$

In the linearized equation of the barotropic model, the rounding off error increases linearly with the time coordinate $t = n\tau$ during step by numerical integration. This is seen from the following equation:

$$\sum_{n*=2}^{M} \delta^*_{m,N} < \sqrt{2} \cdot \delta \cdot N \cdot \sum_{v=1}^{\Sigma^s} \frac{1}{\sqrt{1 - \bar{u}^2 \frac{\tau^2}{\mu^2} \sin^2 vk\mu}}.$$

Subject Headings: **1. Numerical forecasting techniques 2. Truncation error.**—*I.L.D.*

10.8—167 551.509.313:551.551.6

Reiser, H., **On the inclusion of friction in the methods of numerical weather prediction** Germany. Deutscher Wetterdienst, Contract AF 61(514)-735 C, Technical (Final) Report June 30, **1957.** Sec. P (47 p.) 11 figs., 6 refs., numerous eqs. **DWB** (M09.312 G37st)—Starting from a simple model of atmospheric friction ($R' = -\lambda v$, where R' refers to the unit mass, λ is a function depending on height and pressure, and v is the speed of the mass of air) and including simplified expressions of turbulent friction, the author develops a mathematical

treatment of a modification of geostrophic equations to take account of lower boundary conditions. *Subject Headings:* **1. Numerical forecasting 2. Turbulent friction.**—*G.T.*

10.8—168 551.509.313

Reiser, Heinz (*Deutscher Wetterdienst, Frankfurt a.M.*), **Über die numerische Berechnung zukünftiger atmosphärischer Zustände.** [Numerical calculation of future atmospheric conditions.] *Germany. Deutscher Wetterdienst, Berichte,* 5(38):81, **1957.** (Abstract only.) **DWB, DLC**—Owing to the nonlinearity of atmospheric model equations, which as a whole can be solved only by numerical methods, it is difficult to estimate realistically the truncation and rounding off errors; such estimates can be made easily in the case of linearized equations. The estimation of these errors was investigated by using a quasigeostrophic 2-level model. The linearized model equations form simple wave solutions by means of which the general initial problem can be solved by superposition. The solutions are carried out for analytic equations and for differential equations; from a comparison of both solutions, it is possible to consider the behavior of the truncation error which the phase velocities of individual partial waves modify. An evaluation of the uncertainty realm arising through estimation error shows that in baroclinic unstable partial waves this error can increase with the same exponential functions as the wave itself. In the case of real phase velocities, the error increases more slowly as N^2 when N is the number of time steps. This phase difference between partial waves of the analytic model and that of the difference equation resulting from the truncation errors increases linearly with time and very rapidly with diminishing wave length. *Subject Headings:* **1. Numerical forecasting 2. Truncation error.**—*I.L.D.*

WEATHER CONTROL

10.8—169 551.509.616

Berndt, Gerald D., **Summary of the statistical evaluations by the advisory Committee.** (In: U. S. Advisory Committee on Weather Control, **Final Report, pub. 1957.** 2:92–95.) **DWB, DLC**—The author reviews in nontechnical terms the results of the statistical evaluation of the effects of cloud seeding operations analyzed by the Advisory Committee on Weather Control. The physical data were obtained during 12 different cloud seeding projects and embraced 427 storms. The collection of the data for the periods preceding the experimental cloud seeding and the observations recorded during the operations are described in a general way. A general description is presented of the methods of evaluating the results of cloud seeding, including the determination of the normal precipitation over a given period at the operational area, use of replication and regression equations, the classification of the cloud seeding operations into three classes, namely: orographic, semiorographic and nonorographic, and into two groups—the West Coast and the inland nonorographic, etc The results of the evaluations are summarized. Various studies on statistical methods to evaluate cloud seeding experiments included an examination of the characteristics of regression methods of evaluating cloud seeding operations when a target control system is used, the use of the technique of sequential analyses in hail suppression studies, etc. *Subject Headings:* **1. Cloud seeding valuation 2. Cloud seeding studies.**—*I.L.D.*

10.8—170 551.509.616

Boucher, Roland J., **Operation Overseed.** (In: U. S. Advisory Committee on Weather Control, **Final Report,** pub. **1957.** 2:127–136. 7 figs., table, 7 refs.) **DWB, DLC**—The purpose of "Operation Overseed" carried out in the Mt. Washington, (New Hampshire) area was to determine the effects produced in atmospheric cloud by AgI generators operated at minimum distances from the target clouds, and to obtain data on the dispersal and concentration in the free air, both clear and cloudy, of AgI released at some distance from the sampling point. The equipment, consisting of 28 AgI generators of the propane-acetone type and a cold box, and the operational technique are described with the aid of photographs and a map showing the experimental area and the location of the generators. The results of the 76 full scale seeding operations carried out between Sept. 16, 1955 and June 15, 1956 were judged according to the following criteria: nuclei counts were made at Mount Washington Observatory, the cloud liquid

water and drop size measurements at Mount Washington Observatory and visual observation made in the valley. The concentration of ice nuclei can be increased significantly at a distance up to 12 mi by AgI generators emitting about 10^{13} particles at −20°C. The nuclei are most effective in producing nucleation of supercooled clouds in the range of −4°C to −15°C. Concentration of artificial nuclei suggest that "overseeding" by "flooding" of supercooled clouds with nuclei is not feasible with generators having an output limited to 10^{13} particles per second at −20°C. Extreme stability of the atmosphere is a strong deterrent to the vertical transport of artificial nuclei. AgI nuclei produced by the propane-acetone method appear to have a slow rate of decay. A summary of the data and photographs showing examples of glaciation of supercooled clouds and diagrams of nuclei counts and Operation maps are presented. *Subject Headings:* **1. Operation OVERSEED 2. Cloud seeding with silver iodide 3. Silver iodide smoke generators 4. Mount Washington, N. H.**—*I.L.D.*

10.8—171 551.509.617:551.515.22

Braham, R. R., Jr. and Niel, E. A. (*Dept. of Met., Chic. Univ.*), **Modification of hurricanes through cloud seeding.** *U. S. Weather Bureau, National Hurricane Research Project Report*, No. 16, May **1958.** 12 p. 2 tables, 6 refs. **DWB** (M15.2 U5845r)—This report is a description of the technology of cloud seeding, namely: theory and methods of dry ice and AgI seeding, number of nuclei produced, optimum seeding rates, deactivation of AgI smoke, etc. Other seeding agents are mentioned, especially liquid nitrogen (which is not recommended, however, because of difficulties of disposal). Considering the possibility of a useful application of cloud seeding to hurricane modification, the authors state that "initial seeding experiments in hurricanes must be of an exploratory nature with the view that it is unlikely that any definitive conclusions will come from them, but with the hope that they will reveal certain aspects of the storm makeup which then may be studied at length." *Subject Headings:* **1. Cloud seeding techniques 2. Cloud seeding effects on hurricanes 3. Hurricane modification by cloud seeding 4. Hurricane studies.**—*G.T.*

10.8—172 551.509.617:551.576.11

Chuvaev, A. P., **Opyt regulirovaniia razvitiia oblakov moshchnoĭ konvektsii v severo-zapadnykh raĭonakh Evropeĭskoĭ territorii Soiuza SSR.** [Experiment in regulating the development of strong convection clouds in the northwestern regions of European U.S.S.R.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 67(129):59–103, **1957.** 30 figs., 4 tables, 6 refs. **DWB**—During the summer of 1951 and 1952 a series of cloud seeding experiments with solid CO_2 were carried out in order to verify, in different kinds of weather, a previous cloud seeding attempt which resulted in both rainfall and dissipation of the cloud. The characteristics of the clouds investigated (including their thickness, the height of the supercooled layer, the ratio of the supercooled to the warm layer and the temperature range within the clouds) were described and the individual experiments are analyzed in detail. For each experiment the synoptic situation is described and the water content, cloud characteristic, amount of seeding material, the spectrum of cloud droplet sizes and cloud development are presented. The experiments confirm the validity of the previous investigations (*Trudy GGO* [Special Issue] No. 020, **1953**) and they indicate that when intense convection clouds are seeded successfully not only is their growth interrupted but they are dispersed either partly or completely. The introduction of a reagent into the most active zone of the cumulus clouds, which are not undergoing rapid growth, causes them to dissipate by means of the following amounts of dry ice: 0.5–1.0 kg per 1 km, if the cloud has a supercooled layer 1000–1500 m in thickness, and 1–2 kg per km with a supercooled layer 2000–3000 m in thickness. In dissipating intensely convective clouds, the most efficient method of seeding dry ice is by scattering; but evaporation may have only auxiliary importance by expanding the zone of contamination with ice primordia. The establishment of "optimum standard of reagent requires a consideration of wind distribution with altitudes." *Subject Headings:* **1. Cloud seeding experiments 2. Convective clouds**—*I.L.D.*

10.8—173 551.509.61

Houghton, Henry G. (*Chairman, Dept. of Met., M.I.T.*), **Other aspects of weather modification: present position and future possibilities of weather control.** (In: U. S. Advisor

Committee on Weather Control, **Final Report**, pub. 1957. 2:286–288.) **DWB, DLC**—After a few brief comments on such forms of weather control as heating of orchards to protect against frost damage and fog dispersal over airports, the author discusses the problem of whether rainfall can be increased significantly by artificial cloud seeding. A theoretical explanation is offered for the apparent effectiveness of cloud seeding of shower and orographically induced clouds. It is suggested that such clouds which are of short duration lose their water by evaporation if precipitation does not occur, but seeding hastens precipitation and hence increases total precipitation. Total precipitation from a cyclonic storm is not affected much by cloud seeding. The possibilities of weather control in terms of influencing the distribution of atmospheric heating are considered. Those include altering reflectivity of the earth's surface, reducing evaporation of water, etc. *Subject Headings:* **1. Weather control 2. Cloud seeding effectiveness.**—*I.L.D.*

10.8—174 551.509.617

Jaffe, S., **Annual report on a cloud seeding project in Israel, 1956/1957, prepared for the Rainfall Committee of the Research Council of Israel.** Hakirya, Tel-Aviv, Aug. **1957.** 8 p. chart, table.—A summary of the activities of the Artificial Rain Project in Israel during the period from Dec. 1956 through Aug. 1957. A target area in northern Israel was seeded with AgI from ground generators during the main winter period which extends from Nov. to the end of April. All the days during this interval were randomly divided into "seeding days" and "nonseeding days." The results of seeding are evaluated by a method involving "the correlation between precipitation amounts in the target and in a control area and the fitting of theoretical frequency distribution curves to this date." This distribution, which is of a Pearson Type III, is then transformed by equiprobability relationship to a standardized normal distribution. Also a ratio was computed for some stations in Israel between the accumulated precipitation amounts during the seeded and unseeded days of this season. The area of the highest values of the ratio approaches closely the planned target. This may be explained by the fact that the actual target or the affected area does not coincide always with the planned target and that a precipitation maximum was found nearer to the coast than the estimated cloudseeding target. A list of the days selected randomly for cloud seeding during the 1956/57 rain season, the hours of operation during the same rain season and a map showing the target area, the generator location and isohyets for the 1956/57 are presented. *Subject Headings:* **1. Cloud seeding projects 2. Cloud seeding in Israel 3. Israel.**—*I.L.D.*

10.8—175 551.509.617:551.574.2

Nikandrov, V. Ia. (*MGO, Leningrad*), **The problem of the artificial control of cloud and fog.** Trans. of original Russian (source not given), from **1957** [?] imprint. 13 p. 19 refs., 16 eqs. Mimeo. **DWB** (M09.67 N692pr)—A summary of laboratory and field experiments in seeding supercooled clouds with dry ice (at the GGO in Leningrad since 1946) and with other substances such as AgI. A table shows relative success of 60 solid carbon dioxide seeding tests classified into 5°C temp. categories from −60 to −20° C (and −3° to −5°, −1° to −2° and 0°C). Slight precip. occurred in 43 cases and precip. reached the ground in 28 cases. Failures were, respectively, 6 and 10, and, indefinite, 11 and 22 cases. Greatest percent success was at −6° to −10°C. Cloud dissipation (for clouds of <800 m thickness) was said to be almost always effective at temp. <−40°C (supercooled). Practical value for aviation is stressed. The addendum gives more information on the physical processes of cloud nucleation and rain formation. *Subject Headings:* **1. Cloud seeding with carbon dioxide 2. Cloud seeding in U.S.S.R. 3. Cloud seeding evaluation 4. Artificial cloud dispersal 5. Leningrad, U.S.S.R.**—*M.R.*

10.8—176 551.509.617:551.574.2

†Solov'ev, A. D., **Metody iskusstvennogo obrazovaniia ledianykh chastits v pereokhlazhdennykh oblakakh.** [Methods for the artificial formation of ice particles in supercooled clouds.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 17:57–70, 1956. 49 refs., 2 figs. **DLC**—A review of the non-Russian literature on the formation of ice crystals in clouds by ice seeding and by the use of AgI, on the methods of use of AgI and on the artificial

production of rain. *Subject Headings:* **1. Ice crystal formation 2. Cloud seeding with silver iodide.**—*I.L.D.*

10.8—177 551.509.612:551.524.37:632.111.3

Schnelle, Fritz, **Möglichkeiten zur Durchführung von Frostschutzmassnahmen.** [Possibilities for carrying out frost protection.] *Germany. Deutscher Wetterdienst, Mitteilungen,* 3(16):5–12, **1956. DWB**—The author discusses the following aspects of protection against frost: measures to be taken shortly before onset of frost; short range frost protection measures of the weather service, including warning to agriculture of the possibilities of frost occurrence; lectures by weather service personnel before agricultural meetings; participation of weather service personnel in frost prevention measures taken by individual farmers; preparation of pamphlets and notices by the weather service; timely application of frost prevention measures by communities; organizations of local prevention; long range frost protection measures; determination of frost sites by local climatic studies and by mapping of frost damage; establishment of a frost prevention research station, etc. *Subject Headings:* **1. Frost protection 2. Frost warning services 3. Frost prevention.**—*I.L.D.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

DENSITY AND COMPOSITION OF THE ATMOSPHERE

See also: **Stratospheric density charts, N. Hemisphere** (Wege et al.), 10.8–21.

10.8—178 551.510.41:06

Meteorological Office discussion (on) Atmospheric Chemistry. *Meteorological Magazine,* London, 87(1030):108–115, April **1958.** 4 refs. Also: Chapman, S. **[Comment on] the Meteorological Office Discussion (on) Atmospheric chemistry and chemical aeronomy, and [Reply by] B.C.V. Oddie.** *Ibid.,* 87(1035):275–277, Sept. **1958.** 7 refs. **DWB, DLC**—The discussions on atmospheric chemistry were held Dec. 16, 1957 at the Royal Society of Arts. B. C. V. Oddie discussed the methods employed in atmospheric chemistry studies, the distribution of atmospheric chemistry stations in England and in Europe, and the evidence that the sea is the principal source of inorganic matter in the air. Particular consideration is given to the reason for the decrease of inorganic matter brought down by rain with increasing distance inland and the reason for the decrease of the Cl:Na ratio with increasing distance inland. Various mechanisms for this phenomenon proposed by Cauer, Rossby, Junge, etc. are reviewed critically and rejected. The author suggests that a very important means by which inorganic salts are removed from the air is by direct deposition, especially on plants. The change in the Cl:Na ratio may be the renewal at the surface of chlorine or hydrochloric acid released by oxidation of sea salt. Other subjects considered included the method of sampling atmospheric chloride particles carried out on the Meteorological Research Flight involving the use of impactors and slides, and the seasonal distribution of CO_2 in the atmosphere and the distribution of CO_2 between air and sea. Comments made during the general discussion by various speakers are summarized. In the second paper (by Chapman) attention is called to the fact that the discussion did not consider atmospheric ozone. A brief account is given of the chemical aspects of ozone formation and destruction in the atmosphere, the dissociation of water vapor by sunlight into H^+ and $(OH)^-$, the airglow and the field of chemical aeronomy. In reply to Chapman, Oddie justifies his use of the term atmospheric chemistry according to the accepted division between chemical aeronomy and atmospheric chemistry, and agrees that the term atmospheric chemistry ought not to apply exclusively to the lower layers and proposes a new term: tropospheric chemistry. *Subject Headings:* **1. Atmospheric chemistry conferences 2. Atmospheric chemistry 3. Tropospheric chemistry 4. Atmospheric ozone.**—*I.L.D.*

10.8—179 551.510.41:551.556.1(522+521.85)

Shimonoseki District, Japan. Meteorological Observatory, **On the salty wind damage and the salty wind in Kyushu District and Yamaguchi Prefecture.** *Journal of Meteorological Research,* Tokyo, 9(10):685–695, Oct. **1957.** 9 figs., 5 tables. In Japanese; English summary

p. 685. **DWB, DLC**—In this paper the salty wind damage to an insulator and quantity of salt in salty wind are examined statistically. The results are as follows: (1) Geographical distribution of salty wind damage is shown in Fig. 1. (2) Frequency of the time of beginning of salty wind damage is shown in Fig. 2. (3) Monthly variation in number of frequency of salt wind damage is shown in Fig. 3. (4) Observational methods of salt quantity in salty wind were examined. The measurement of salt quantity in this study is determined by the salt quantity stuck on gauze (Tables 3–5). (5) Relation between the salt quantity stuck on gauze and the distance from the seashore is shown in Fig. 9. *Subject Headings:* **1. Saline wind damage 2. Salt content of air 3. Kyushu District, Japan 4. Yamaguchi Prefecture, Japan.**—*Authors' abstract.*

ATMOSPHERIC POLLUTION

See also: **Air pollution surveys, Texas** (Paganini), 10.8–20; **Air pollution serials,** 108.–40; **Air pollution conf.** (Thring, *ed.*), 10.8–67; **Dust layers and twilight phenomena** (Megrelishvili), 10.8–185; **Resonance scattering and dayglow theories** (Brandt, Chamberlain), 10.8–238.

10.8—180 551.510.42(791)

Arizona. Bureau of Sanitation and Sanitary Engineering. **Air Pollution in Phoenix, Arizona: report of a short, intensive air pollution sampling study.** Its *Air Pollution Report*, No. 1, Jan. **1958.** 7 p. figs., tables. **DWB** (M10.42 A719ai)—A 7-day sampling of pollutants in the air at Phoenix was made on Jan. 16–22, 1957, to determine diurnal and weather effects on various types of gases and smoke. It was found that Phoenix has as much of a problem as the coastal cities of California (gasoline consumption has gone up 80% since 1948 and population has trebled since 1940). Oxidant concentration was 0.19 ppm, or somewhat less than the 0.25 ppm limit indicated for eye irritation. On a cloudy day this limit fell to its lowest value. Air pollution in general is less on weekends than on week days. Further studies recommended are outlined and methods and results described and illustrated. *Subject Headings:* **1. Atmospheric pollution 2. Phoenix, Airz.**—*M.R.*

10.8–181 551.510.42(435.6)

Berge, Helmut (*Agri. Inst., Düsseldorf*), **Kritische Betrachtungen zu dem Kartenwerk mit Staubpegelzonen nach Sedimentationsmessungen der Landesanstalt für Bodennutzungsschutz des Landes Nordrhein-Westfalen, Bochum.** [Critical remarks on the cartography of dust level zones according to sedimentation measurements of the Institute for Land Conservation of Nordrhein-Westphalia at Bochum.] *Meteorologische Rundschau*, Berlin, 10(5):173–174, Sept./Oct. **1957.** table. **DWB, DLC**—After giving a table showing the areas, time intervals, etc. over which dustfall measurements were made in connection with the cartography of dust fall levels for the Nordrhein-Westphalia province, the author criticizes the procedure involved. None of the observation periods at the various points amounts to a half year so that only winter and summer differences in air pollution were considered. In addition, the collecting vessels were inadequate. At some points SO_2 and at others SO_3 content was measured. The collecting vessels were not emptied after a uniform time of exposure (some after 7, others after 14 days), etc. *Subject Headings:* **1. Dust fall analysis 2. Bochum, Germany.**—*I.L.D.*

10.8—182 551.510.42:551.574.11(494)

Bider, M. (*Basel*), **Die Messung der Zahl der Kondensationskerne als Mass für die Luftverunreinigung.** [Condensation nuclei count as a measure of air pollution.] Reprint from *Strasse und Verkehr*, Solothurn, **1956**:530–534. 7 figs., 8 refs., tables. **DWB, DLC**—Various aspects of the urban air pollution problems are discussed on the basis of information contained in monographs by Meetham (1952), Kratzer (1956), Landsberg (1938), the author (1954), and others. The number of nuclei found in various parts of a city or in various landscapes, diurnal variations in clear and cloudy weather, and wind direction, wind speed, day of week and local effects on nuclei count or pollution are shown in tables, on graphs, wind roses or charts from data obtained at Basel. The Verzár (1953) nuclei counting and recording apparatus is described and illustrated. *Subject Headings:* **1. Condensation nuclei-atmospheric pollution**

estimation 2. Atmospheric pollution Verzár photoelectric nuclei counter 3. Basel, Switzerland.—*M.R.*

10.8—183 551.510.42:551.551.2:628.53

Bosanquet, C. H. (*Res. Dept. Imperial Chemical Industries*), **The flow of chimney gases.** (In: Thring, M. W. (*ed.*), **Air pollution.** pub. London, **1957.** p. 114–123. 2 tables, eqs.) **DWB** (M10.42 T531ai)—An investigation of the effects of upward flow of smoke plume from chimneys, of the gases that escape through the chimneys, and of the interaction by wind variations, is made in order to predict the intensity of pollution to be expected after the completion of a power station or factory. This report is presented with a discussion of the dilution due to wind, the effect of buoyancy and the concentration of effluents on the ground. *Subject Heading:* **1. Stack meteorology.**—*N.N.*

10.8—184 533.6.07:551.510.42

Strom, Gordon H.; Hackman, Murry and Kaplin, Edward J. (*all College of Engineering, N. Y. Univ.*), **Atmospheric dispersal of industrial stack gases determined by concentration measurements in scale model wind tunnel experiments.** *Air Pollution Control Association, Journal*, 7(3):198–203, Nov. **1957.** 6 figs., 7 refs. Written discussion by Maynard E. Smith and Irving A. Singer, and reply by Strom et al., p. 203–204. **DLC, DWB**—Sulfur dioxide concentration equipment produces better and more useful results when wind tunnel scale model experiments are made. Such an experiment was made by New York Univ. The material gives a description of the concentration measuring apparatus and the technique employed in such wind tunnel experiments. The experimental results are shown in three figures as the vertical concentration profiles (1) through plume 1440 ft downwind of stack for various configurations, (2) at various distances downwind of stack and (3) as ground level concentration versus distance downwind of stack. This quantitative form of data becomes more significant when these wind tunnel experiments are correlated with field studies. *Subject Headings:* **1. Wind tunnel experiments 2. Gas dispersal patterns 3. Diffusion of gases. I. Smith, Maynard E. II. Singer, Irving A.**—*N.N.*

STRUCTURE OF THE ATMOSPHERE—UPPER ATMOSPHERE-IONOSPHERE

See also: **Upper atmos. texts.** (Massey, Boyd), 10.8–6; **Mean stratospheric charts., No. Hemisphere** (Wege et al.), 10.8–21; **IGY upper atmos. program** (Ben'kova), 10.8–47; **Arctic ionospheric res. bibliogs.** (Agy), 10.8–55; **Ionosphere radio wave prop. anomalies** (Kitchen, Joy), 10.8–95; **Satellite orbits** (King-Hele, Leslie), 10.8–96; **Ionograms and auroral zone** (Knecht), 10.8–140; **Radio met. and tropospheric variations** (Anastassiades, Paraskevopoulos), 10.8–191; **Auroral zone and magnetic storms** (Matsushita), 10.8–360.

10.8—185 551.510.53:551.510.42:551.593.55

Megrelishvili, T. G., **O vozmozhnosti issledovaniia aerozol'nykh sloev sumerechnym metodom.** [The possibility of studying aerosol layers by a twilight method.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:560–563, April **1958.** 3 figs., 15 refs., 3 eqs. **DLC.** English translation in *Indian Journal of Meteorology and Geophysics*, Delhi, 9(3):271–276, July **1958.** 3 figs., 16 refs. **DWB, DLC**—Various studies on the presence of aerosol particles in the upper layers of the atmosphere and on the use of twilight scattering for their detection are reviewed briefly. A detailed critical analysis is made of E. K. Bigg's study on the **Detection of atmospheric dust and temperature inversions by twilight scattering** (*see* 7.5–103, May 1956, *MAB*). Bigg concluded that dust accumulations and temperature inversions were present at elevations around 15–20 km. It is shown that Bigg's assumption of the height of the earth's shadow is incorrect; a more correct estimate of the height of the scattering layer is 35–40 km. In addition, twilight observations do not permit the separation of closely situated layers, so that Bigg's computed layers are not real dust layers. The author presents twilight curves for two different spectral regions, namely: $\lambda = 5270$ Å and $\lambda = 9400$ Å, constructed on the basis of the height of the effective scattering layer. The maximum twilight scattering was obtained at 47 km and 100 km. These maxima may be attributed to fluorescence as well as to the pres

ence of dust. *Subject Headings:* **1. Dust layers 2. Twilight phenomena. I. Bigg, E. K.**—*I.L.D.*

10.8—186 546.21:551.510.53:541.1

Nicolet, M. (*Inst. Royal Météorologique de Belgique, Service du Rayonnement, Uccle*), **La dissociation de l'oxygène dans la haute atmosphère.** [The dissociation of oxygen in the high atmosphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):301–304, **1958.** 11 refs. French, German and English summaries p. 301. **DWB, DLC**—An aeronomic study of departures from photoequilibrium conditions in the lower thermosphere shows that the peak of atomic oxygen concentration occurs in the neighborhood of 90 km. Its veritical distribution must be associated with the airglow emission at 5577 Å and the low temperatures above the mesopause. *Subject Headings:* **1. Atomic oxygen distribution 2. Upper atmosphere chemistry.**—*Author's abstract.*

10.8—187 523.77:551.510.53:551.521.326:551.594.5

Shklovskiĭ, I. S. (*Inst. for Atmos. Physics, Acad. of Sci. of the U.S.S.R., Moscow*), **Elementary processes in the upper atmosphere and their manifestation in emissions.** *Annales de Géophysique*, Paris, 14(4):414–424, Oct./Dec. **1958.** 17 refs., 5 eqs. **DLC**—This article is subdivided into three chapters. a) New type of fluorescence in the upper layers of the terrestrial atmosphere; b) Some remarks on the excitation of Hα emission in aurorae; c) Interplanetary gas and some geophysical problems. Of the great variety of elementary processes in the upper atmosphere, leading to the emission of various lines and bands observed in the spectra of the night airglow and aurorae, only the principal ones are discussed. Among their number is a new type of fluorescence in the upper atmosphere and also the problem of interaction of solar corpuscules with the atoms and molecules of the terrestrial atmosphere. *Subject Headings:* **1. Upper atmosphere 2. Fluorescence in the upper atmosphere 3. Auroral spectra 4. Night airglow spectra.**—*A. V.*

10.8—188 621.396:551.510.535(94)

Albrecht, Hans J. (*Schramberg-Sulgen*), **Further studies on the chordal-hop theory of ionospheric long-range propagation.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 11(1):84–92, **1959.** fig., 4 tables, 9 refs., 5 eqs. German and French summaries p. 84. **DWB, DLC**—This paper presents new results of the author's investigations on ionospheric propagation in Australia from 1952 to 1957. Considerations on path attenuation are followed by a discussion on the propagation paths to North America and Western Europe. Conclusions are in agreement with the author's previous publications in this field. *Subject Headings:* **1. Ionospheric radio wave propagation theories 2. Radio propagation over water. 3. Australia.**—*Author's abstract.*

10.8—189 551.510.535:551.594.12

Al'pert, Ia. L., **Electron density fluctuations and the scattering of radio waves in the ionosphere.** *Soviet Physics JETP*, New York, 6(1):167–175, Jan. **1958.** Trans. by I. Emin of original Russian **Fluktuatsii elektronnoĭ plotnosti i rasseianie radiovoln v ionosfere,** in *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, 33(1):213–224, July **1957.** 7 figs., 12 refs., 27 eqs. Also: Proshkin, E. G. and Kashcheev, B. L., **On the question of the fluctuations of electron concentration in the F-layer of the ionosphere.** *Soviet Physics JETP*, 6(4):818–819, April **1958.** Transl. by H. Zirin of original Russian, **K voprosu o fluktuatsiiakh elektronnoĭ kontsentratsii v F-sloe ionosfery,** in *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, 33(4):1062, Oct. **1957.** figs., 2 refs. **DLC**—A description is given of results from a determination of electron density fluctuations obtained by measuring the "turbidity coefficient" of the ionosphere and energy scattered at very high frequencies. The linear dimensions ξ of inhomogeneities at ~ 80 km, which are effective in UHF scattering, were also determined. The formulas employed were based on an expression for the scattering cross section σ which was obtained with the autocorrelation coefficient $\rho(r) \sim \exp\{-(r/\xi).^2\}$. The author concludes that when the ionosphere is sounded at frequencies below the critical frequency, the received signal comprises, in addition to the "specularly" reflected wave, waves which are principally scattered forward and partly reflected at higher ionospheric levels. In oblique distant UHF transmission through

the ionosphere, scattering from inhomogeneities of optimum size makes the largest contribution. PROSHKIN and KASHCHEEV report an application of AL'PERT's formula to the calculation of the distribution of F layer electron density inhomogeneities effective in ordinary wave scattering (KHARKOV, 1955–1956; diagram) and find no altitude dependence of electron density fluctuations. *Subject Headings:* **1. Electron density in F layers 2. Radio wave scattering 3. Ionospheric scattering.**—*G.T.*

10.8—190 551.510.535:551.510.62

†Al'pert, Ia. L., **Kratkiĭ ocherk sovremnnykh predstavleniĭ o rasprostranenii radiovoln v ionosfere.** [A short sketch of present ideas on the propagation of radio waves in the ionosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 11:1418–1430, **1957.** 56 refs. **DWB**—After a brief review of the history of our knowledge of the propagation of radio waves, the author summarizes our present knowledge on the ionospheric propagation of radio waves and, in particular, Soviet contributions to this knowledge. A review of the various studies on the influence of the earth's surface on the distribution of radio waves includes the work of V. A. FOK on the change in the velocity of radio waves with distance, the effects of a plane and spherical earth upon the propagation of radio waves, the influence of the earth's surface on the propagation of long radio waves, the "washing out" and dispersion of the conductive layer of the ionosphere, etc. The discussion of the relationship between the ionosphere and radio waves includes an account of the structure of the ionosphere (electron concentration, etc.), reflections of radio waves in the ionosphere, extinction of waves and plasma as a function of the field charge of incident waves, etc. *Subject Headings:* **1. Ionospheric radio wave propagation 2. Ionospheric structure.**—*I.L.D.*

RADIO PROPAGATION

See also: **Radar echoes from atmos. inhomogeneities** (Jones), 10.8–132; **Refractive index, Germany** (Bean, Ozanich), 10.8–137; **Ionospheric radio wave prop.** (Al'pert), 10.8–190.

10.8—191 551.510.62:551.510.5

Anastassiades, M. and Paraskevopoulos, P., **Sur la variabilité des conditions troposphériques déterminée par les considérations radioélectriques.** [Variability of tropospheric conditions determined from radioelectric considerations.] *Académie des Sciences, Paris, Comptes Rendus*, 246(26):3656–3658, June 30, **1958,** 3 refs. **DLC**—Thera Island is connected with the island of Crete through a hertzian beam, operating on 1750 Mc/s with a purely maritime run of 120 km. Certain meteorological factors can have an effect on the intensity of the field picked up. The examination of a large number of field recordings has established that the experimental curves of the field distribution did in fact agree with Rayleigh's rule in the case of periods superior to a certain limit. By using a special recorder the authors were able to draw the experimental curves of the field distribution for time-periods ranging as far as a fraction of one minute. Generally, the field distribution agrees entirely with Rayleigh's rule, but departs from this distribution in a very characteristic way as soon as time-periods shorter than 10 min are reached. The deviation from this rule indicates unchanging tropospheric conditions, and in this manner, starting from radioelectric determinations, one could determine the longest period during which the troposphere presents unchanging characters. *Subject Headings:* **1. Radio meteorology 2. Tropospheric variability.**—*A.V.*

10.8—192 551.510.62:551.593.7:621.39

Bailey, V. A. (*Univ. of Sydney*), **Some methods for studying wave-propagation in a uniform magneto-ionic medium.** *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3):118–125, **1958.** figs., 4 refs., 34 eqs. **DLC**—The difficulty in using the classical general formulas of APPLETON, for determining the refractive and absorption indices and the polarization of each of the two wave-modes, is primarily due to the presence of the radical term ρ $\sqrt{\nu_T 4\delta^2 + \nu_L{}^2}$ where δ is the reciprocal of a given complex number. This difficulty has been overcome by means of each of four methods of calculation developed in the School of Physics of the University of Sydney. The first three, although previously published, are here pre

ented again but briefly. The fourth method makes use of the following approximations:

$$\sqrt{1+s^2} \quad \text{equals} \quad \frac{4+3s^2}{4+s^2} \quad \text{or} \quad s\,\frac{4s^2+3}{4s^2+1}$$

ccording as $|s| \lesseqgtr 1$ (except when $s^2 \doteq -1$). On applying them to APPLETON's formulas, by taking $s = 2\nu_L\nu_T^{-2}(1+\tau+i\beta)$, we obtain the good approximate formulas (32) and (33) or M^2 (square of the complex refractive index) which, in effect, cover all possible situations vith an error not exceeding about 1%. Other applications of these approximations to $\sqrt{1+s^2}$ an be made: for example to the polarization numbers R, for, with the same value of,

$$R = is^{-1}\{1 \mp \sqrt{1+s^2}\}.$$

Subject Headings: **1. Refractive index 2. Radio wave polarization.**—*Author's abstract.*

10.8—193 551.510.62:621.396.81

Barghausen, A. F.; Janes, H. B.; Guiraud, F. O. et al., **Measurements of the power spectrum of fading in tropospheric scatter propagation.** *U. S. National Bureau of Standards, NBS Report,* No. 5575, May 22, **1958.** 8 p. + 9 figs., 4 tables, 3 refs. **DWB** (621.384 B251me)—Gives a description of the transmission paths, equipment and measurements of the field intensity recordings made during Jan., March, April, Nov. and Dec., 1957, at 1046 megacycles, on two different tropospheric scatter paths in Colorado and Kansas. Data from the seven periods selected for power spectrum analysis indicate an input of about 600 equally-spaced values of signal amplitude for each sample studied. The spectra were similar in shape. *Subject Headings:* **1. Tropospheric scattering 2. Tropospheric propagation beyond the horizon. I. Murshata, S. II. Peterson, C. F.**—*N.N.*

10.8—194 551.510.62:621.396

Barsis, A. P., **Tropospheric propagation measurements within the radio horizon over Cheyenne Mountain paths.** *U. S. National Bureau of Standards, NBS Report,* No. 3520, Jan. 1, **1955.** Supplement 5. 8 p. 8 figs., 2 refs. **DWB**—The Cheyenne Mountain Field Station of the Central Radio Propagation Laboratory is conducting certain tropospheric propagation measurements whereby the field intensities for several optical paths can be recorded. Recordings for each site are made for 12 consecutive months. Then the diurnal and the monthly variations of hourly median values of each received field are plotted on graphs. An investigation is further conducted on the dependence of the interdecile range of the hourly median for each site and each frequency on the overall median level, time of day, and its change from month to month. "Prolonged space-wave fadeouts" are examined for their frequent occurrences. This examination shows that they are more prevalent in summer than in winter, occurring principally at night. *Subject Headings:* **1. Tropospheric propagation 2. Radio fading patterns.**—*N.N.*

10.8—195 621.396:551.510.62

Barsis, Albrecht P., **Comparison of calculated and measured fields within the radio horizon for the 92 Mc to 1046 Mc range.** *U. S. National Bureau of Standards, NBS Report,* No. 3520, Jan. 1, **1955.** Supplement 11. 5 p. 5 figs., 3 refs. **DWB**—Propagation characteristics of space waves transmitted over irregular terrain may be computed by replacing significant portions of the terrain with a smooth surface, and determining the field by usual methods applicable to such smooth surfaces. The data analyzed (92 to 1046 Mc) appear to indicate that RAYLEIGH's criterion must be less than 0.1 for the earth to be considered smooth in ratio field intensity calculations. *Subject Heading:* **1. Radio wave propagation.**—*N.N.*

10.8—196 551.510.62:621.396

Barsis, Albrecht P.; Capps, F. M. and Norton, E. M., **Survey of propagation characteristics of sea test range in vicinity of the Naval Air Missile Test Center, Point Mugu, (Progress Report No. 4).** *U. S. National Bureau of Standards, NBS Report,* No. 5052, March 15, **1957.** 6 p. 18 figs., 5 refs. **DWB**—Measurement procedures, discussion of expected results on the basis of theoretical studies of the propagation paths, and meteorological characteristics were

contained in an earlier Progress Report (No. 2). This report contains an evaluation of th radio data from a purely operational point of view, as well as an interpretation of the data b the use of available meteorological information derived from radiosonde ascents at San Nicola Island and at Point Mugu Naval Air Station. *Subject Heading:* **1. Radio propagation ove water.**—*N.N.*

10.8—197 551.510.62:621.39

Barsis, Albrecht P. and Kirby, Robert S., **Long distance tropospheric propagation meas urements between North Africa and Spain, Pt. 1, Theoretical estimates, path description, an method of operation.** *U. S. National Bureau of Standards, NBS Report*, No. 5067, (1957) 16 p. 17 figs. (incl. photos), tables, 7 refs. **DWB**—The Radio Systems Applications Engineer ing Section of the Radio Propagation Engineering Division, National Bureau of Standards Boulder, Colo. has undertaken a study of propagation conditions in the VHF and UHF ban over a 200 mi path between Morocco and southern Spain. The ultimate purpose of this stud is to provide estimates of power requirements and other design data for a multi-channel com munications system to be installed between the path terminals. Meteorological data obtaine from the usual sources provide the basis for correlation studies between observed radio dat and the commonly used atmospheric parameters. (For Pt. 2, *see* 9.11–167, Nov. 1958, *MAB.* *Subject Heading:* **1. Radio propagation over water.**—*N.N.*

10.8—198 551:510.6

Bean, Bradford R. and Thayer, G. D., **A model radio refractivity atmosphere.** *U. S National Bureau of Standards, NBS Report*, No. 5576, NBS Project 8380-11-8361, June 9, 1958 88 p. 15 figs., 11 tables, 21 refs., 33 eqs. **DWB**—It has been noted that at least 50% of th total bending of a radio ray by the earth's atmosphere takes place in the first kilometer abov the earth's surface. It is also noted that the simple difference, ΔN, between the value of th refractivity near the earth's surface N_s, and at one kilometer above the earth's surface, N_1, ma be described by:

$$-\Delta N = N_s - N_1 = 7.32 \exp\{0.005577 N_s\}.$$

A model of the vertical structure of N may be defined solely in terms of N_s by assuming a linea decay of refractivity in the first kilometer above the earth's surface, an exponential decay fro N_1 to a point of constant refractivity at an altitude of 9 km above sea level and a single exponenti decay above 9 km. This model atmosphere is in good agreement with the actual N structur of the atmosphere, particularly when considering long term means. A set of reference atmos pheres is defined in terms of certain combinations of N_s, ΔN and the station elevation. Th magnitude of the elevation angle errors and the radio range errors are evaluated for variou values of N_s, initial elevation angles, and radio ranges. *Subject Heading:* **1. Refractive inde models.**—*Authors' abstract.*

RADIOACTIVITY

10.8—199 551.510.7:551.577

Becker, F. (*Königstein/Ts*), **Neue Messergebnisse der Luft- und Niederschlags-Radi aktivität.** [New results from measurements of radioactivity in air and precipitation.] *Ann len der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:177–179, **1958.** 3 figs.,2 ref **DWB**—After a brief discussion of earlier studies on the presence of radioactive substance in th atmosphere as influenced by meteorological conditions, the author examines the atmospher radioactivity supplementary to natural radioactivity. The variation of daily means of β- radioactivity from Feb. 1–May 31, 1957, indicating a relationship between intensity variatio of radioactivity and weather processes and the radioactivity of precipitation, are discusse with the aid of graphs showing the mean daily variations of β—activity, disintegration curv of precipitation radioactivity and the variation of $+\beta$ activity of precipitation for the perio April 26 to June 7, 1957. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Radi activity in precipitation.**—*I.L.D.*

108.—200 551.510.7:662.2:539

Bollay, Eugene; Klopsteg, Paul E.; Von Neumann, John and Reichelderfer, R. W. (*all Pan on Meteorological Effects of Nuclear Explosions*), **Effects of nuclear explosions on weather.** (1

J. S. Advisory Committee on Weather Control, **Final Report,** pub. **1957.** 2:410–411.) **DWB, DLC**—The report of the Panel on Meteorological Effects of Nuclear Explosions of the Advisory Committee on Weather Control is presented. The Panel concluded tentatively that there is either an absence of significant meteorological effects or it is unfeasible to obtain positive indications of such effects above the meteorological "noise level." In the case of nuclear warfare which would involve numerous atomic explosions, "effects upon weather and climate would not be at all unlikely." Possible effects of nuclear explosions upon meteorological conditions could come about through a change in the albedo of the earth; also inert as well as charged and radioactive dust particles might serve as nucleating agents. *Subject Heading:* **1. Nuclear explosion effects on weather.**—*I.L.D.*

10.8—201 551.510.7:551.551:551.576.1

Garbaliauskas, Ch. A., **Ob issledovanii sviazi mezhdu nekotorymi meteorologicheskimi rotsessami i radioaktivnym sostoianiem atmosfery.** [Study of the relation between some meteorological processes and radioactivity of the atmosphere.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Goegrafijos Institutas, Moksliniai Pranešimai,* 5:27–30, **1957.** table, 4 refs. **DWB**—By discussing the daily course of radioactivity of the surface air layers and of atmospheric precipitation, the author stresses the role of atmospheric turbulence and of the clouds in de-activation of the surface layers of the atmosphere. The figures given in the article suggest a natural circulation of radioactive admixtures between the earth's surface and the clouds. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Atmospheric turbulence effects on radioactivity 3. Cloud effects on radioactivity.**—*Author's abstract.*

10.8—202 551.510.7:551.577.7

Garrigue, H., **Mesures sur la radioactivitié d'origine atomique de l'air et des précipitations.** [Measurements on the radioactivity of atomic origin in the air and in precipitation.] *Académie des Sciences, Paris, Comptes Rendus,* 246(21):3089–3091, May 28, **1958.** 2 refs. **DLC**—Radioactivity of the free air is measured by taking suspended particles of the atmosphere by means of a high voltage system installed aboard a plane or on the ground. The author also measures the radioactivity of evaporation residues of rain, snow, rime and glaze in the Puy-de-Dôme region. A series of measurements shows recent increase of radioactive pollution. Dust due to the drought after radioactive rain pollutes the air near the ground very much and at certain places radioactive concentrations, several thousand times above those in the free atmosphere before the beginning of precipitation, are observed. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Radioactivity in precipitation.**—*A. V.*

108.—203 551.510.7:551.579:546.11.023(261)

Giletti, Bruno J.; Bazan, Fernando and Kulp, J. Laurence, **The geochemistry of tritium.** *American Geophysical Union, Transactions,* 39(5):807–818, Oct. **1958.** 4 figs., 9 tables, 24 refs., eqs. **DWB, DLC**—The tritium concentration has been determined in precipitation, ocean water, and ground water. Although the steady-state tritium "cycle" has been disturbed by thermonuclear testing, enough analyses of pre-test water have been made to conclude that: (1) the North Atlantic surface water had a natural mean $T:H = 1.0 \times 10^{-18}$ which doubled in 1954 because of the Castle tests, (2) this water mixes down to the seasonal thermocline in one year, (3) the North Atlantic Central Water appears to be 25 yrs old off the coast of Portugal, (4) measurable tritium was found in three bottom samples in the North Atlantic suggesting a young age for some of that water, (5) the hot waters of the Tecolote Tunnel, Calif., were from recent (nine months) rains, (6) direct runoff of precipitation from the ground surface to streams was at least 3% of the total precipitation in the Hudson River basin in 1954, (7) the natural rate of production of tritium is calculated from a budget on the North Atlantic to be 0.75 ± 0.4 H^3 atoms/sec cm^2 of earth's surface. *Subject Headings:* **1. Tritium analysis 2. Radioactivity in precipitation 3. Radioactivity in ocean water 4. Radioactivitiy in surface water North Atlantic.**—*Authors' abstract.*

10.8—204 551.510.72(434.2)

Israël, H. and Ludwig, G., **Die künstliche Radioaktivität der Atmosphäre in Aachen am 1. April 1958.** [Artificial radioactivity in the atmosphere in Aachen, April 1, 1958.] *Meteoro-*

logische Rundschau, Berlin, 11(4):131–132, July/Aug. **1958.** 3 figs., 4 refs. **DWB, DLC**—On April 4, 1958 artificial radioactivity of the atmosphere rose suddenly in Aachen and returned to normal after 24 hrs. The age of the radioactivity was determined by means of the formula $J = J_0 t^{-x}$ (t—time and x—assumed approximately equal to 1) since 95% of the artificially radioactive aerosol was of the same age and source. The origin of the air masses which gave rise to the sudden increase in radioactivity was determined by means of trajectories for surface flow and for flow at the 500 mb surface. Both atmospheric paths lead to a point of origin for the radioactive particles situated in the region of the East Siberian coast—Kamchatka. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Aachen, Germany.**—*I.L.D.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Dynamic met. text.** (Laĭkhtman), 10.8–8; **Truncation error in num. prediction** (Magata), 10.8–160; **Angular momentum** (Arakawa), 10.8–215; **Trade wind circulation** (Bjerknes), 10.8–216; **Eddy transfer calculations** (Koo), 10.8–263.

10.8—205 551.511:551.524:551.526.

Fritz, S. (*U. S. W. B., Wash., D. C.*), **Seasonal heat storage in the ocean and heating of atmosphere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):291–300, **1958.** 4 figs., 11 refs., 6 eqs. German, English and French summaries p. 291–292. **DWB, DLC**—One method of computing the seasonal heat budget of the atmosphere involves the seasonal heat storage in the oceans. On the basis of bathythermograph data and ocean surface temperatures, the heat added to or released by the ocean was computed month by month. The heat stored in the ocean was then compared with GABITES' estimate of the heat added by radiation and by means of the latent heat of water vapor. From this comparison, the heating of the atmosphere was approximated. In middle latitudes, the net heating of the atmosphere is close to zero during most of the year, so that even the sign of the atmospheric heating is in doubt there. During most of the year, the atmosphere undergoes net heating in low latitudes and net cooling in high latitudes. The excess is removed by motions of the atmosphere and the ocean. *Subject Headings:* **1. Heat balance of atmosphere 2. Heat exchange sea atmosphere 3. Ocean temperatures.**—*Author's summary.*

10.8—206 551.511:551.558:551.576.2:551.577.3

†Sanders, Frederick, **Cloudiness and precipitation in relation to large-scale vertical motion and moisture.** Mass. Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-1305, Scientific Report No. 4, March **1958.** 90 p. 5 figs., 21 tables, 19 refs., 46 eqs. **DWB**—The theory of large scale vertical motion in a simple baroclinic model of the atmosphere is discussed, with particular reference to approximate methods of rapidly calculating this motion. A method of combining dynamical, orographic and frictional contributions to vertical motion is described. The occurrence of cloudiness and precipitation in the central and eastern U. S. in autumn, winter and spring is related to concurrent values of the theoretical vertical motion. The percent frequency of clear skies or scattered clouds ranges from about 45% with pronounced descending motion to about 10% with marked ascent. The corresponding percent frequencies or occurrence of precipitation at a given time range between approximately 10% and 35% respectively. Consideration of isobarically-advected moisture as an additional parameter produces a modest improvement in these results. Low air mass cloudiness and associated precipitation is not well-related to the dynamical vertical motion. Deficiencies and limitations of the techniques are discussed, and suggestions for improvements are made. *Subject Headings:* **1. Vertical motion computation 2. Precipitation-vertical motion relationships.**—*Author abstract.*

10.8—207 551.511:551.521

Van Mieghem, J. (*Inst. Royal Météorologique de Belgique et Université de Bruxelles*), **Radiation data needed in dynamical meteorology.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):285–290, **1958.** 9 refs. German, English and French summaries p. 28[illegible] **DWB, DLC**—In order to be able to account for nonadiabatic effects on atmospheric processes the space and time distributions of actual values of the radiation balance must be known in th[illegible]

atmosphere and at its boundaries. As for synoptic data, the representativeness of radiation data is an essential requirement. *Subject Heading:* **1. Radiation data for dynamic meteorology.**—*Author's abstract.*

10.8—208 551.511.3:551.509.314

Andreoletti, Jean, **Dynamique et statistique en météorologie.** [Dynamics and statistics in meteorology.] *Journal Scientifique de la Météorologie*, Paris, 10(38): 77–86, April–June 1958. eqs. **DWB**—Study of various types of forecast methods: a) forecast of pure dynamic derived from the mechanics, and applied to an atmospheric model with horizontal parameter fields; b) dynamic forecast with statistical adjustment; c) quadratic forecast; d) linear forecast. The determination of this last method is based upon three selections: 1) choice concerning the representation of an atmospheric model; 2) choice of the form of forecast operator; 3) choice of an error criterion, i.e., a quantitative expression representing the "difference" between the dissimilarity between two states of the atmosphere. The author gives the quantitative determination of the operator and a classification in sub-ensemble of analogues and some classification methods. This article shows that it is possible to devise forecasting quantitative methods, the bases of which rest on dynamic conditions on the one hand, and statistics on the other, such methods reaching from pure dynamics to pure statistics. *Subject Headings:* **1. Forecasting techniques 2. Dynamics 3. Statistics in meteorology 4. Atmospheric models 5. Analog classification.**—*A.V.*

10.8—209 551.511.3:551.509.313

Berkofsky, Louis, (*U. S. Air Force Cambridge Res. Center, ARDC, Boston.*) **Some estimates of nongeostrophic effects calculated from a vertically integrated nongeostrophic model.** *Germany. Deutscher Wetterdienst, Berichte*, 5(38):6–13, **1957.** 3 figs., 8 refs., 63 eqs. English and German summaries p. 6. **DWB, DLC**—The use of nongeostrophic models in numerical forecasting has the advantage that nongeostrophic effects may be included and that the equations remain valid at low levels. Since the solution given by vertically integrated equations may be approximated to any other desired level, a nongeostrophic baroclinic vertically integrated model needs to be formulated. The two dimensional mean flow (vertically integrated) equations are obtained by integrating the appropriate equations with respect to pressure throughout the depth of the atmosphere and then introducing modelling approximations, which represent constraints on the vertical structure of the fluid such that parameters may be made to depend upon parameters at a specific level." The formulation of such modelling approximations in the nongeostrophic case is illustrated by an example in which the horizontal wind vector is represented as the sum of an irritational and a nondivergent vector. The physical model considered in comparing results obtained from a geostrophic with a nongeostrophic model, is the thermotropic model which is a vertically integrated quasi-geostrophic model. The deviation of nongeostrophic flow equations directly comparable to quasi-geostrophic equations is presented. The effects of nongeostrophic flow conditions are studied by considering one dimensional nonlinear flow. There are presented examples of numerical computations from which were obtained rough estimates of the height tendencies for various degrees of departure of the initial conditions from geostrophic conditions, all corresponding to the same initial stream field. *Subject Headings:* **1. Nongeostrophic models 2. Nongeostrophic wind approximation 3. Numerical forecasting.**—*I.L.D.*

10.8—210 551.511.3:551.513.1

Bjerknes, Jakob (*Calif. Univ. at L.A. Dept. of Meteorology*), **The meridional heat flux in summer.** (In California. Univ. at L.A. Dept. of Meteorology, Contract AF 19(604)-1286, final Report, June **1957.** Article 4 [8 p.] 4 figs., eq.) **DWB**—Heat flux measurements for each day during July–Aug. 1949, are analyzed for 15°–80°N and presented in charts of: 1) total sensible heat flux; 2) rate of rise of temperature due to convergence of sensible heat flux; 3) observed day to day changes of the integrated temperature; and 4) departure of observed integrated temperature changes from those due to sensible heat flux convergence. Profiles of heating are compared with Mintz and Lang's model of the Hadley and Ferrel circulations in summer, giving good quantitative agreement. *Subject Headings:* **1. Meridional heat flux charts 2. Summer atmospheric circulation models 3. Northern Hemisphere.**—*M.R.*

10.8—211 551.511.3:551.509.313

Edelmann, Winhart (*Deutscher Wetterdienst, Frankfurt a.M.*), **Vergleich verschiedener dreidimensionaler Modelle der Atmosphäre mittels Lösungen linearisierter Gleichungen.** [Comparison of various three-dimensional models of the atmosphere by means of solutions of linearized equations.] *Germany. Deutscher Wetterdienst, Berichte,* 5(38):25–30, **1957.** fig., 2 tables, numerous eqs. **DWB, DLC**—The author compares various three-dimensional models of the atmosphere in order to determine their characteristic differences. These include the geostrophic advection model, without and with stability, the model with geostrophic stream function, the Thompson model, the nongeostrophic advection model (without stability), the noise model, the Hollmann-model and the W′ model. The linearized equations of these models are analyzed. A stationary zonal fundamental flow is assumed and a small disturbance is imposed upon it. Solutions for the fundamental barotropic flow, closed solutions for the baroclinic fundamental flow and approximate solutions for the baroclinic fundamental flow are presented. *Subject Headings:* **1. Atmospheric models 2. Linear equations 3. Numerical forecasting.**—*I.L.D.*

10.8—212 551.511.3:551.509.313

Hinkelmann, Karl (*Deutscher Wetterdienst, Frankfurt a.M.*), **Über die Einbeziehung divergenter Windkomponenten in Vorhersagemodelle.** [Inclusion of divergent wind components in forecasting models.] *Germany. Deutscher Wetterdienst, Berichte,* 5(38):56–63, **1957,** fig., 4 refs., 47 eqs. Transl. issued in Germany. Deutscher Wetterdienst, Contract AF 61(514)-735 C, June 30, **1957,** Technical and Final Report. Section B(21 p.). **DWB**—In this mathematical theoretical paper the author, using a simple example, examines the degree to which the use of extended wind equation—which takes into account transport by nongeostrophic wind instead of the quasigeostrophic model—modifies forecasts. The geostrophic wind equation is extended by including a vector that is derivable from the velocity potential. While this extension avoids the principle defects of the geostrophic model, its results become unrealistic in regions of almost disappearing absolute vorticity. *Subject Headings:* **1. Geostrophic equations 2. Wind divergence 3. Numerical forecasting models.**—*I.L.D.* (*based on author's summary*).

10.8—213 551.511.32:551.511.2

Bykov, V. V., **Ob uravneniiakh dinamiki atmosfery pri gipoteze kvazisolenoidal'nosti** [Equations for dynamics of the atmosphere using the quasi-solenoidal hypothesis.] *Meteorologiia i Gidrologiia,* No. 11:8–14, Nov. **1956.** fig., 12 refs., 21 eqs. **DWB, DLC.** Trans. (pp. 11–14) into English with title **On the equation of numerical prediction in relation to the non-divergence concept** by A. Nurklik, issued as *Canada. Defence Research Board, Translation,* No. 39, April **1958.** Available **DWB** (M09.3 B993on)—The solution of the equations of continuity of heat flow (adiabatic conditions) and of the hydrostatic equation for the quasi-geostrophic approximation in short range forecasting is discussed. This is followed by a detailed account of the solution of the differential equations associated with the hypothesis of quasi-solenoidality developed by Charney and Bolin. This use of this hypothesis for short range forecasting depends upon the solution of the balance equation:

$$\rho\Delta\varphi + 2\left[\frac{\partial^2\varphi\partial^2\varphi}{\partial x^2\partial y^2} - \left(\frac{\partial^2\varphi}{\partial x\partial y}\right)^2\right] + \beta\frac{\partial\varphi}{\partial y} = \Delta H.$$

The solution of this equation is proposed by rewriting it in the form:

$$\Delta q = \frac{2}{\rho}\left[\left(\frac{\partial^2\varphi}{\partial x\partial y}\right)^2 - \frac{\partial^2\varphi\partial^2\varphi}{\partial x^2\partial y^2}\right] - \frac{\beta}{l}\frac{\partial\rho}{\partial y} = Q(x,y).$$

The numerical solution of this equation is presented, and the physical significance of the number of this equation is indicated by synoptic charts. Also, the system of forecasting equations on the assumption of quasi-solenoidality of the wind for a baroclinic atmosphere is considered. *Subject Headings:* **1. Dynamics of the atmosphere 2. Charney-Bolin hypothesis 3. Numerical short range forecasting.**—*I.L.D.*

GENERAL CIRCULATION

See also: **Arctic met. and jet stream** (Reed), 10.8–56; **Meridional heat flux charts, N. Hemisphere** (Bjerknes), 10.8–210; **Temp. changes, N.W. Europe** (Fay), 10.8–250; **Atmos. water balance** (Starr et al.), 10.8–277.

10.8—214 551.513:551.511.2

Gordon, A. H. (*Meteorological Office, Stanmore*), **A low latitude general circulation model.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):339–349, **1958.** fig., 3 tables, 3 refs., 9 eqs. English, German and French summaries p. 339. **DWB, DLC**—The primitive equations of motion are solved to find peak latitudes of families of trajectories of air moving from low latitudes towards the pole from a state of rest under the action of a constant meridional pressure gradient. The general case is discussed first and then calculations are applied to the 20° West meridian in Jan. and July for the Northern Hemisphere. The resulting mass transposition indicates that a belt of convergence should occur at about 32°N in Jan.; this agrees well with the latitude of the axis of the mean sub-tropical high pressure belt at that time of year. The nature of the climatological model in low latitudes suggested by the calculation is then discussed. *Subject Headings:* **1. General circulation models 2. Equations of motion 3. Low latitude circulation.**—*Author's summary.*

10.8—215 551.513.1:551.511.3

Arakawa, Akio (*Met. Res. Inst., Tokyo*), **On the mean meridional circulation in the atmosphere.** *Meteorological Society of Japan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 230–236. 2 figs., 9 refs., 4 eqs. **DWB, DLC**—The longitude-mean meridional circulation, which is determined through the balance requirement of angular momentum, is discussed and computed in the case of winter and summer, 1949. Main difficulties occur in the estimation of frictional dissipation and vertical eddy transport of angular momentum. Theoretical treatments for the adiabatic, frictionless disturbance are developed, assuming the phase angle of each wave component of disturbance to be random, and, a relation between the accumulation of angular momentum by three-dimensional eddy process and the horizontal eddy transport of sensible heat is found. This relation makes it possible to estimate the direction and the strength of meridional circulation if the horizontal eddy transport of sensible heat and frictional dissipation are known. Under the conditions which exist in the atmosphere, it is concluded that there is a three-cell meridional circulation in the troposphere with an indirect cell (Ferrel type) in middle latitudes and direct cells (Hadley type) in low and, perhaps, high latitudes. *Subject Headings:* **1. Mean meridional circulation 2. Angular momentum.**—*Author's abstract.*

10.8—216 551.513.1:551.511.3

Bjerknes, Jakob and Venkateswaran, S. V., **A model of the general circulation of the tropics winter.** (In: California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(604)-1286, Final Report, June **1957.** Article 3 [28 p.] 12 figs., table, 16 refs. eqs.) **DWB**—A detailed dynamical analysis of the general circulation of the trade-wind zone (5°S to 271°N) from which the atmosphere gains angular momentum through friction at the earth's surface. The zonal momentum equation is modified to include effects of space and time smoothing. The kinematics of the Hadley circulation and associated eddy stresses is treated at some length, and the budget of angular momentum and heat in the tropics in summer and winter calculated. Effect of the Alaskan Ranges and of ocean currents on energy transport is considered in the model of the Northern Hemisphere. *Subject Headings:* **1. Atmospheric models 2. Trade wind circulation 3. Heat and moisture balance 4. Northern Hemisphere.**—*M.R.*

10.8—217 551.513.2:551.557.5

Kao, S.-K. (*Dept. of Met., Univ. of Calif.*), **Planetary waves and jet streams in the atmosphere.** *American Geophysical Union, Transactions*, 39(4):620–623, Aug. **1958.** 3 figs., 10 refs., 12 eqs. **DWB, DLC**—A systematic analysis of planetary waves in a zonal current with jet stream, linear velocity shear, and uniform angular velocity shows that (1) the phase velocity of the planetary waves in a zonal current with jet stream increases or decreases depending, respectively, on the narrowing or broadening of the jet stream; (2) the increase or decrease of

the dimension of the planetary waves follows, respectively, the broadening or narrowing of the width of the jet stream; (3) the major effect of a linear velocity shear in a zonal current is to damp out waves in the current; (4) the streamline pattern in a zonal current on a spherical earth with uniform angular velocity exhibits major characteristic features in the atmosphere such as subtropical highs, jet stream, westerly waves, high latitude lows and polar easterlies and (5) the effect of viscosity is to damp out all waves in the current. *Subject Headings:* **1. Planetary waves in zonal currents 2. Jet stream.**—*Author's abstract.*

10.8—218 551.513.2:551.553.21

†Sorochan, O. G., **Nekotorye soobrazheniia o prirode letnego mussona Vostochnoĭ Azii.** [Some considerations on the nature of summer monsoon in Eastern Asia.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 71:184–208, **1957.** 17 figs., 7 tables, 33 refs. **DWB** (M(055) U581tG)—Contemporary conceptions of the monsoon (Khromov, Flohn) do not regard it as the result of differential warming of land and water, the establishment of seasonal changes in pressure gradients and consequent differing directions of wind flow, but rather as the consequence of the seasonal alternation of planetary wind zones resulting from the sequence of the seasons. The climatological, synoptic and hydrodynamic points of view which give rise to differing conceptions of the origin of the summer monsoon owing to their different analysis of the initial data are summarized. The author then presents the results of investigations of the synoptic climatological situations associated with the stable atmospheric flow of the summer monsoons of East Asia. Data from mean surface charts of pressure and atmospheric temperature were compared with corresponding data from AT_{500} and $RT_{\frac{500}{1000}}$ charts for points on land and water laying upon a single parallel (20, 40 and 65°N lat.) at a distance of 20° (meridians 80, 100, 120, 140, 160°E long. and 180, 160, 140, 120°W. long.). The summer monsoon of East Asia is a complex flow of general circulation arising from the interaction of conditions determined by thermal inhomogeneity of the land and water surfaces with various characteristics of the general circulation (frontal activity of extratropical latitudes, conditions of the formation of subtropical highs) and with the orography of East Asia. The summer monsoon as a flow of the general circulation, is manifested as a disintegration of the west-east transport over Eurasia which occurs in two stages; the synoptic situation from April to June is the first and that from July to Oct. the second stage. The first stage of the summer monsoon is within the 3 km layer of the troposphere, where cold air is transported from east to west; above this layer is the west-east transport. The second stage includes the lower 6 km layer of the troposphere; above this layer there is no anti-monsoon. Difference in the prevailing trajectories of the cyclones and the moisture content of the monsoon in the first and second stages explain why the first stage, in spite of the increased frequency of cyclonic fields, is accompanied by less rainfall. The properties of the air masses transported to the coasts in both stages of the summer monsoon determine the distribution of summer rainfall. The localization of troughs and ridges aloft during the summer monsoon appears as an increased frequency of the Yakut trough. The principle role in the first stage of the summer monsoon belongs to the regions of high pressure over the Sea of Japan and the northwest Pacific Ocean. During the second stage the principle role belongs to the Pacific subtropical high (Northern Hemisphere) and probably to the high pressure zone of the Southern Hemisphere. *Subject Headings:* **1. Monsoons 2. Monsoon circulation 3. Eastern Asia.**—*I.L.D.*

10.8—219 551.513.7:551.555

Bjerknes, Jakob (*Univ. of Calif., L. A.*), **Related fluctuations of tradewinds and northern climates.** *Geophysica*, Helsinki, 6(3/4):169–177, **1958.** fig., 4 tables, 9 refs. **DWB, DLC**—The model of the general atmospheric circulation in low latitudes, briefly the Hadley circulation, has been defined in better quantitative terms than heretofore by Palmén's theoretical and empirical investigations. In particular, he has been able to show that the meridional mass circulation, measured by a judicious statistical treatment of pilot balloon data from the trade wind belt, is compatible with our theoretical knowledge about the dynamics of a toroidal axial circulation on our rotating planet under the influence of multi-scale vertical and lateral exchange processes. The present article makes an attempt at analyzing the implications for the meridional heat flux represented by a time change in the North Atlantic tradewinds pointed out

BULLIG in his **Atlas** (3). Conclusions can be drawn about a probable average increase in eridional heat flux by the winter-time Hadley-Palmén circulation and by the northward joining eddy exchange over the period 1906–37 covered by BULLIG's statistics. This increase northward heat flux in low and middle latitudes is timed right to make it acceptable as the use of the warming of the Arctic in the nineteen twenties and thirties. *Subject Headings:* **Trade wind variations 2. Climatic changes due to trade wind effect.**—*Author's abstract.*

ATMOSPHERIC DISTURBANCES

See also: **Radar obs. of clouds and thunderstorm activity** (Kolokolov), 10.8–133; **Barotropic models and stream functions** (Masuda), 10.8–161; **Cloud seeding effect on hurricanes** (Braham), 10.8–171.

10.8—220 551.515.11:551.557.5

§Shellum, Harold J. and Tait, Gordon C. (*both, Natl. Wea. Analysis Center, U. S. W. B., ash., D. C.*), **A classic example of rapid cyclogenesis in the midwest, February 25–28, 1958.** *onthly Weather Review*, Wash., D. C., 86(2):71–79, Feb., **1958.** 8 figs., 11 refs. **DWB, DLC** A synoptic case history study of a severe cyclonic storm which developed over the Southern ains on Feb. 25, 1958, producing on Feb. 27 all time low pressures in Kansas and Oklahoma – vest was 9.73 mb at Columbia, Mo. A similar storm occurred on Feb. 27, 1902, when Oklama City had its previous record low pressure. Heavy rain, snow, glaze, high winds, tordoes and floods caused many deaths and injuries as well as property damage. A strong high rel (300 mb) jet was traced from China (Feb. 17) to California (Feb. 25) to the Mid-Atlantic ates (Feb. 28). This high speed jet moving into a region of diverging cyclonically curved ntours is given as the cause of the record sea level pressures and height falls aloft and strong rtical motion. *Subject Headings:* **1. Cyclonic storm, Great Plains (Feb. 1958) 2. Cyclonesis-jet stream relationships 3. Synoptic case history studies 4. Great Plains.**—*M.R.*

10.8—221 551.515.13:551.557:551.507.3(265)

Arakawa, Hidetoshi (*Met. Res. Inst., Tokyo*), **Case study of erratic movements of well-veloped cyclones and upper air circulation over the NW-Pacific.** *Meteorological Society of pan, Tokyo, 75th Anniversary Vol. of the Journal*, pub. Nov. **1957.** p. 187–191. 12 figs., ble, 4 refs. **DWB, DLC**—During the first half of Feb. 1956, two well-developed cyclones owed pronounced abnormal trajectories in the N.W. Pacific. In this case, the upper air culation suggested by 300 mb charts and the trajectory of transosonde flights at 300 mb de by U. S. Navy Transosonde Project show a fine harmony with the said trajectories of two clones. *Subject Headings:* **1. Cyclone movements 2. Upper air circulation 3. Transonde trajectories 4. Northwest Pacific.**—*Author's abstract.*

10.8—222 551.515.13(99)

Arnett, John S., (*Natl. Wea. Records Center, U. S. W. B., Asheville, N. C.*), **Principal tracks Southern Hemisphere extratropical cyclones.** *Monthly Weather Review*, Wash., D. C., 2):41–44, Feb. **1958.** 3 figs., 7 refs. **DWB, DLC**—Three large charts of the Southern misphere show extratropical cyclone tracks during Feb.–March, June-July, and Oct.–Nov., en from daily charts for Jan. 1951–Nov. 1953. All storm centers south of 30° lat. were tted on monthly charts and the areas of maximum concentration then delineated. Individal storm tracks were also drawn for each month. Only one sector of the Antarctic Continent ms to be invaded by cyclones—the Ross and Weddell Sea areas. Maximum southern disrcement occurs in summer. *Subject Headings:* **1. Southern Hemisphere cyclone tracks Extratropical cyclone track charts 3. Antarctica 4. Southern Hemisphere.**—*M.R.*

10.8—223 551.515.13

Crutcher, Harold, L. (*U. S. W. B., Natl. Weather Records Center, Asheville, N. C.*), **An lication of Hotelling's "T^2" distribution to meteorology.** *Journal of Meteorology*, Boston, 2):242–244, April **1958.** 3 figs., 4 refs., 2 eqs. See also: Hotelling, Harold,; **The generalion of Student's ratio.** *Annals of Mathematical Statistics*, 2:360–378, **1931. DWB, C**—In the studies of MANTIS and MILLER on the motion of cyclones in eastern U. S. and

along the eastern coast of Asia, stratification into two types was made. In the first, Type A cyclones originated along a cold front while Type B along a warm front. In the second, Type cyclones originated west of 130° east long., while Type II originated east of 130° east long The working equations for these tests are presented. In the case of the Atlantic Coast cyclone the computed value of T is 0.90 while the critical value of T_0 is 2.43. In the Asiatic cyclone T is 3.16 and T_0 is 2.43. Thus, as regards the 24 hr movement, Atlantic cyclones of Types A and B appear not to be different, while the 24 hr movements of Asiatic cyclones differ signif cantly on the percent level. The geographic stratification for Asiatic cyclones should improv forecast accuracy. The distribution of the displacement of the cyclones is illustrated by mean of graphs. *Subject Headings:* **1. Cyclone movement 2. Cyclone structure 3. Hotelling' "T^2" distribution.**—*I.L.D.*

10.8—224 551.515.13(267.4

*Rao, K. N. and Jayaraman, S. (*both, Met. Office, Poona*), **A statistical study of frequenc of depressions/cyclones in the Bay of Bengal.** *Indian Journal of Meteorology and Geophysic* Delhi, 9(3):233–250, July **1958.** 3 figs., 25 tables, 15 refs. **DWB, DLC**—There is a genera impression that the total number of annual depressions and cyclones in the Bay of Bengal decreasing in recent years. This aspect of the subject does not appear to have been studied s far. It was, therefore, felt that it would be of interest to make a detailed statistical study the frequency of depressions and cyclones in the Bay of Bengal in different years. The dat utilized for study in the paper were compiled by the Investigation and Development Section the Office of the Deputy Director General of Observatories (Forecasting) and include all de pressions for which tracks could be shown. *Subject Headings:* **1. Cyclone frequencies 2. Ba of Bengal.**—*Authors' abstract.*

10.8—225 551.515.21:551.515.7

Alaka, M. A. (*Secretariat, WMO*), **Dynamics of upper-air outflow in incipient hurricane** *Geophysica*, Helsinki, 6(3/4):133–146, **1958.** fig., 9 refs., 28 eqs. **DWB, DLC**—The possibili is envisaged that upper anticyclonic flow, under certain suitable conditions, exceeds the critic value given by the quantity $\left|\frac{fr}{2}\right|$. When this happens, an air particle which is given a accelerating impulse will normally continue to move down the pressure gradient and susta further acceleration. It is suggested that this process may be important in triggering hurrica development. *Subject Headings:* **1. Hurricane development 2. Upper anti-cyclone effect hurricane development.**—*Author's abstract.*

10.8—226 551.515.41:551.509.311(541

Koteswaram, P. and Srinivasan, V. (*both, Met. Office, Calcutta*), **Thunderstorms ov Gangetic West Bengal in the premonsoon season and the synoptic factors favorable for thr formation.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):301–312, Oct. 19 7 figs., 5 tables, 13 refs., 8 eqs. **DWB, DLC**—The occurrence of thunderstorms in the pr monsoon season over Gangetic West Bengal, in relation to low level synoptic conditions as w as high level perturbations, has been examined. It is shown that neither of these factors itself can produce convective activity, the important condition being the super-position of up divergence associated with a high level perturbation over a low level convergent area. T upper divergence occurs due to a variety of perturbations—a straight jet stream, a jet stre trough, a trough or even an anticyclonic vortex—and the lower convergence is provided b low or trough at the surface. The importance of shearing advection in producing diverge in jet stream zone is pointed out and the relative efficacy of the various perturbations in prod ing squalls associated with thunderstorms is analyzed. *Subject Headings:* **1. Synoptic con tions 3. West Bengal, India.**—*Authors' abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Insolation and albedo, Quebec-Labrador** (Jackson), 10.8 24; **Solar furnace** (Halacy), 10.8–30; **Geophysical serials,** 10.8-42; **Glaciology, Adélie Land** (Loewe), 10.8–57; **Antarctic oases** (Rusin), 10.8–59; **Solar energy symposium, Phoenix, Ariz.,** 10.8–65; **Strawberry culture** (Suzuki et al.), 10.8–114; **Processes in the upper atmos.** (Shklovskiĭ), 10.8–187; **Radiation data for dynamic met.** (Van Mieghem), 10.8–207; **Cloud type-insolation rel.** (Parczewski), 10.8–291; **Scattering of light** (Sekihara), 10.8–350.

10.8—227 778.3:551.521:551.576.2

Dirmhirn, Inge, **Die Weitwinkel-Himmelsaufnahme als Hilfsmittel für die Strahlungs-schung.** [Wide-angle sky photograph as an aid to radiation research.] *Archiv für Meteor-ie, Geophysik und Bioklimatologie, Ser. B,* Vienna, 8(3/4):336–351, **1958.** 5 figs., 36 photos, efs., 3 eqs. **DLC**—In the study of sky radiation, both the calculation and measurement of radiation role of individual parts of the sky when clouds are present are made. In this per the author describes a camera using a wide angle lens of 154° aperture to photograph udiness. The cloud picture is evaluated, the sky cover is divided into equal angle zones @ 10° each) or equal area zones. The radiation intensity from energy zone is, for the mer

$$i_z = i_0 \cdot (1 - m_z + m_z \bar{h}_z) \cdot f_z \cdot v_z \cdot \cos \bar{a}_z$$

ereby i_0-radiation intensity of blue sky areas, m_z—cloudiness zones in tenths, $\bar{h}_z$—mean ghtness of the cloud-covered sky relative to that of the blue sky, a_z—mean zenith distance of , f_z—factor taking into account the area, and v_z—the distortion zone considered. In the e of equal area zones $i = i_0 (1 - m_z + m_z \bar{h}_z) \cdot v_z \cdot \cos \bar{\beta}_z)$. The relative cloud effect factor for zone is

$$b = \frac{\sum_{z=1}^{10}}{i_0} = (1 - m_z + m_z \cdot \bar{h}_z) \cdot \cos \bar{\beta}_z \cdot v_z.$$

e application of this method and the evaluation of cloud photographs is illustrated with the of a specific example. The use of cloud photography in recording radiation, in order to onstruct subsequently cloud conditions, etc., is discussed. *Subject Headings:* **1. Radiation earch 2. Wide-angle sky photographs 3. Cloud photography.**—*I.L.D.*

10.8—228 551.521:551.525

*Dobosi, Zoltán, **Vizsgálatok egy hazai talajfelszín sugárzási mérlegéről.** [Study of the iation balance of a soil surface in Hungary.] *Időjárás,* Budapest, 61(4):260–265, July/Aug. **7.** 2 figs., 7 tables, 9 refs. Russian summary p. 260. **DLC**—Radiation data obtained at lohat-Puszta in 1953–1955 are presented. They include annual variations and totals of iation, absorption by the soil surface, effective outgoing radiation and atmospheric back iation. Periods with a negative radiation balance are treated separately. The annual ation balance obtained fits fairly well into the regional pattern mapped by foreign, especi- Soviet, investigators. *Subject Hedaings:* **1. Radiation balance 2. Radiation data 3. ohat-Puszta, Hungary.**—*G.T.. (Transl. of author's abstract).*

10.8—229 551.521.1:523.74

†Allen, C. W. (*Univ. of London Obs., London*), **Solar radiation.** *Royal Meteorological iety, Quarterly Journal,* 84(362):307–318, Oct. **1958.** 9 figs., 2 tables, 37 refs. **DWB, DLC** he astronomer is interested in the radiant flux reaching the outer edge of the earth's atmos-re in its entire spectrum, windows, variations of solar radiation and their causes, losses in atmosphere and the solar constant. These factors are discussed in some detail with appro-te graphs to show the magnitudes and relations of the various parameters or factors quan-tively. The author shows graphically that apparent changes in the solar constant with

sunspot cycle from 1920–1953 are probably due to changes in the reduction procedures rath than in the variables themselves and that the real dispersion due to solar variations is n $> 0.1\%$. Thus solar radiation is an excellent natural constant. Variations of 10% in U received at the earth are likely due to variations in atmospheric transmission rather than solar variations. Radio radiation varies tremendously with sunspot cycle but has small tot energy. *Subject Headings:* **1. Solar radiation variations 2. Solar constant.**—*M.R.*

10.8—230 551.521.1:621.

Baum, V. A. (*Carnegie Inst. Wash; Calif. Inst. Tech.*) and Strong, J. D. (*Prof. Physics, Joh Hopkins*), **Basic optical considerations in the choice of a design for a solar furnace.** *Sol Energy*, Phoenix, Ariz., 2(3/4):37–45, July/Oct. **1958.** 10 figs., 2 tables. **DWB**—Simple rel tionships exist between the aperture of a solar furnace, the target size, the angle of convergenc the maximum attainable concentration ratio, the over-all efficiency, and the amount of sp light surrounding the target. For optical systems having continuous unobstructed surfac and no spherical aberration, the concentration ratio is determined solely by the angle of co vergence. Various systems differ considerably, however, in the amount by which their ape tures exceed that of an ideal system of equal performance; in the resulting efficiency at whi they operate; in the associated amount of waste light spilled outside the target; in the distrib tion of this spill light; and in the relative convenience with which they can be fabricated a adjusted. A paraboloidal mirror with heliostat does not seem to be an optimum choice. T optical possibilities afforded by other two-mirror systems are discussed and illustrated by e ample. We also present structural design for a two-mirror system which appears to posse some practical advantages over the heliostat-paraboloid combination. *Subject Heading:* **Solar furnaces.**—*Authors' abstract.*

108.—231 551.521.1:551.581(100

Burdecki, F., **Remarks on the distribution of solar radiation over the surface of the ear** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 8(3/4):326–335, 19 5 figs., 3 tables, 14 refs. **DLC**—Black's (*Arch. für Met. Geophys. und Bioklim., Ser B*, 7(165–189, **1956,** *see* 7.9–156, Sept. 1956, *MAB.*) empirical equation and presuppositions computing the total amount of incoming solar radiation measured on a horizontal surface examined critically. Using the maps of Black, the author calculated the total solar radiat on the earth's surface per day for Jan., April, July and Oct. and for the entire year for each three parts of the surface, namely: 90°N to 15°N, 15°N to 15°S, and 15°S to 90°S. There evidence that the northern part of the earth's surface has the greatest annual radiation tu over, the equatorial a small one, and the southern part the lowest. Very striking is the A maximum of mean daily total radiation between 10°N and 25°N. A study of the longitudi distribution of radiation amounts for April minus July indicates the existence of three m centers of positive anomaly, which is particularly accentuated over India. These anoma reflect the enormous influence of the seasonal change in cloud amount upon the climate region. Budyko's formula for amount of total radiation is presented and the charts c structed by Black and those by Budyko are compared. They show general agreement differences in detail. Thus the July chart of Black shows a conspicuous "centre of heati on an area from 0° to 20°S and 60° to 80°N. This is absent in the Budyko maps. The res provide new evidence for the statements of Burdecki that the thermal rhythm of the w atmospheric ocean is dominated by the rhythm of the Northern Hemisphere, and that the calculation over both hemispheres is asymmetric. *Subject Heading:* **1. Solar radiation tribution.**—*I.L.D.*

10.8—232 551.521.1:551.501.9:0

†Drummond, A. J. (*Radiation Service, South African Weather Bureau, Pretoria*), **S radiation studies in Africa.** (In: Angola. Serviço Meteorológico, **Miscelanea geofis** Luanda, **1956.** p. 101–113. fig., 4 tables, 20 refs. **DWB** (M(08) A592mi)—In this pap review is presented of the progress made in solar radiation measurement and research in A during the last five years. Details are given of the continental network of radiation stat which has been built up in Region 1 of the World Meteorological Organization. General va

otal radiation are given for ten stations with at least three years' record; similar values of use radiation are tabulated for eight of these stations. *Subject Headings:* **1. Solar radiation earch 2. Radiation networks 3. Africa.**—*Author's abstract.*

10.8—233 551.521.1(677.3)

*Fàntoli, Amilcare, **Le prime misure della radiazione globale in Somalia.** [The first global iation measurements in Somaliland.] *Rivista di Meteorologia Aeronautica*, Rome, 18(2): 6, April/June **1958.** 5 figs., tables, 16 refs., eqs. French, English and German summaries . **DLC**—After giving some information concerning the actinometric network and the pub- tion of observations, the writer gives data on global radiation, sunshine duration, cloudiness, nperature, vapor pressure and rainfall; all of these collected at Mogadiscio during three rs, and at Bonka during one year (1956). The relationship is then inquired into, based first ll upon the complementary function of cloudiness as referred to sunshine duration between udiness and other variables. However, the usual formulas do not point out said relationship, bably because of the fragmentary character of cloudiness, which allows for high values of shine duration, whilst the strong reflecting power of cloud accounts for high global radiation. *ject Headings:* **1. Global radiation data 2. Somaliland.**—*Author's abstract.*

10.8—234 551.521.1(469):551.506 551.508.21

†Morais, J. Custódio de (*Dir. Inst. de Geofísico*), **Um ano de medidas de radiação solar mal no Instituto Geofísico da Universidade de Coimbra.** [A year of normal solar radiation asurements at the Geophysical Institute of the Coimbra University.] Coimbra, Tipografia Atlântida, **1956.** 23 p. 2 figs., 3 tables, 37 refs. English summary p. 21–22. **DWB** 21.1 M827an)—Data for June 1955–May 1956 on normal solar radiation received with a rczyński pyrheliometer in 3 spectral regions at Coimbra Univ. Inst. of Geophysics are pre- ted in a table in analytical form (total insolation on cloudless days, air mass, energy ab- ɔed by water vapor in percent, precipitable water in cm, percentage radiation diffused by e or aerosols, coefficient of turbidity β of Ångström, Linke's turbidity factor, Bouguer's nsmissivity factor and number of observations). A graph shows variation of solar radiation ensity with varying aspects and with varying solar angle (1955–56), and Linke's turbidity or for clear and cloudy skies. The various types of actinometers, etc. used in such studies described. Pyrheliometric observations began at the Institute in 1916. *Subject Headings:* **Solar radiation data 2. Radiation instruments 3. Coimbra, Portugal.**—*M.R.*

10.8—235 551.521.1:551.508.21

Sihvonen, Y. T.; Majkowski, R. F. and Slater, W. (*all General Motors Corp., Detroit*), **A sentation of solar radiation data obtained by a spectroheliometer.** *Solar Energy: the rnal of Solar Energy Science and Engineering*, Phoenix, 2(1):21–25, Jan. **1958.** 10 figs., fs. **DWB**—An instrument that measures solar radiation has been fabricated and put into ration. This instrument, called a spectroheliometer, continuously records and integrates sun's radiant power in five selected wave length intervals, and in addition incorporates a heliometer to measure over-all solar radiation. The individual spectral bands covered are 5–3260 Å, 3410–3630 Å, 3865–4150 Å, 4420–4900 Å, and 5385–6295 Å. Spectroheliometer taken in tests near Miami, Fla. from Feb. 1954 to Aug. 1956 give information concerning approximate solar power and energy distribution curves and the effects of season, time of day, meteorological conditions, etc., upon them. During a full year of Florida operation, energies received in the individual spectral bands (in order of increasing wave lengths) 0.195, 1.28, 2.83, 8.41, and 20.37 watt-hours per sq cm. The direct solar-noon power dis- ution curve obtained in Florida shows good correlation with other published data, but ates a slightly higher distribution at the longer wave lengths and a need to increase the pted value of the solar constant from 1.94 cal per min per sq cm. A comparison made een Detroit, Mich. and Miami, Fla. sunshine reveals an interesting phenomenon called ur twinkle," an irregular repetitive variation in solar radiation reaching the ground which ught to be due to excessive foreign particles in the atmosphere and/or some form of atmos- ic turbulence. *Subject Headings:* **1. Spectroheliographs 2. Solar radiation measure- techniques 3. Solar radiation data 4. Miami, Fla. 5. Detroit, Mich.**—*Authors' ict.*

10.8—236 551.521.14:551.578.46:535.

Dirmhirn, Inge, **Zur spektralen Verteilung der Reflexion natürlicher Medien.** [Spectr distribution of reflections from natural media.] *Wetter und Leben*, Vienna, 9(3/5):41–46, 195 4 figs., table, 5 refs. **DLC**—In view of the fact that 28% of the spectral distribution of glob radiation at high solar elevation is in the infrared region which is important in heat balance, t author carried out reflection measurements over the entire region of the spectrum from abo 0.3 to 3μ. For the determination of reflection from rocks, plants and partly from snow radi tion, a projection lamp (220 V, 110 W) was used as a radiation source for wave lengths abo 0.45 μ, and an Osram mercury lamp (1.2 Å, 50 V) as a complement towards the ultraviolet en The spectrum was analyzed by a monochromator which received wave lengths of 0.2 to 2.6 The energy was measured with an ultraviolet sensitive photocell for 0.3–0.8 μ, with a germaniu photocell for 0.6–2.0 μ, and with a lead sulfide photocell resistance for 1.7–2.5 μ. The spectr reflections of bright marble, gneis, old snow and plant leaves, the spectral intensity distributi of global radiation, and reflection of these same media, the albedo of a fresh meadow below a at various distances from a nut tree and the integral reflection for heat effect of 0.3–3 μ (albed and percent brightness and albedo are presented in graphs and tables. The microclima spectral change of incoming radiation and albedo is discussed. *Subject Headings:* **1. Spectr reflectivity of natural surfaces 2. Albedo of snow 3. Albedo measurement.**—*I.L.D.*

10.8—237 551.521.14:551.578.

Sulakvelidze, G. K., **Al'bedo snezhnogo pokrova.** [Snow cover albedo.] *Akadem Nauk Gruzinskoĭ SSR, Tiflis. Institut Geofiziki, Trudy*, 12:163–178, **1953.** 2 figs., 4 tables, refs., 6 eqs. **DLC**—Methods and results of studies of (1) overall reflection of total radiati from snow cover made with a Ianishevskiĭ pyranometer equipped with gelatin filters, and the penetration of solar radiation into the snow depth with aid of under-snow Ianishevsk Sulakvelidze pyranometers, carried out in 1946–1950 in the Caucasus, at various heig (from 1000 to 5000 m above sea level) are described and discussed. *Subject Headings:* **Albedo of snow surface 2. Caucasus, U.S.S.R.**—*A.M.P.*

10.8—238 551.521.16:546.33:551.510

Brandt, J. C. and Chamberlain, J. W. (*both, Univ. of Chicago*), **Resonance scattering atmospheric sodium, Pt. 5, Theory of the day airglow.** *Journal of Atmospheric and Terrest Physics*, London, 13 (1/2):90–99, Dec. **1958.** 4 figs., table, 16 refs., 31 eqs. **DLC**—CHA RASEKHAR's theory of radiative transfer is applied to obtain the D_2 and brightness as a function of the sodium abundance and ground albedo. An analytic metho integrating monochromatic intensities over a Doppler profile has been developed, eliminat the necessity for numerical quadratures. This method is general and could be used to simp calculations in the twilight and night airglow sodium problems as well. A high ground alb can nearly double the radiation incident on the sodium "layer," compared with direct sunli alone. A general derivation is given of HUNTEN's (Pt. III) approximation for an effec optical thickness. In Appendix A the twilight problem is treated from the standpoint of analytical method of line integrations and equations are given that may be used to extend accuracy of the solutions; in Appendix B some X- and Y-functions for small optical thickne are tabulated; Appendix C gives basic formulae for extending the accuracy of analytical s tions to transfer problems in line radiation. (For Pts. 1–4, *see* 8.2–149 and 8.2–150, Feb. 1 and 10.2–219, Feb. 1959, *MAB.*) *Subject Headings:* **1. Dayglow theories 2. Sodium atmosphere 3. Radiative transfer 4. Resonance scattering.**—*Authors' abstract.*

10.8—239 551.521.16:535.33:546.33:551.51

Brandt, J. C. (*Univ. of Chicago*), **Resonance scattering by atmospheric sodium, Pt. 6, analytic solution for the twilight intensity.** *Journal of Atmospheric and Terrestrial Phy* London, 13(1/2):100–106, Dec. **1958.** fig., 4 tables, 7 refs., 13 eqs. **DLC**—With the met outlined by BRANDT and CHAMBERLAIN (1958) in Pt. V of this series, the analytic solutio the twilight intensity is obtained in terms of rapidly converging series expressions. All o necessary functions for the solution are tabulated and it is found that three terms of the s give an error less than 0.5% for the range $0 \leq \tau_0 \leq 0.20$. A sample computation is mad an angle of solar depression, β, of 6°.5 and the values are in excellent agreement with the nu

al work published previously. *Subject Headings:* **1. Sodium in atmosphere 2. Resonance attering 3. Twilight intensity computation.**—*Author's abstract.*

10.8—240 551.521.17:551.521.31

Minnis, C. M. and Bazzard, G. H. (*both, Radio Res. Station, Ditton Park, Slough*), **Similari-es in the characteristics of solar radiation at λ 10.7 cm. and in the far ultra-violet.** *Nature*, ondon, 181(4626):1796, June 28, 1958. 2 tables, 5 refs. **DWB**—The variations of two in-ces of the solar cycle representing the flux of two different types of solar radiation are closely lated. The two types of radiation are produced under closely correlated conditions. During ie June 1954 eclipse of the sun, ionospheric measurements were made in Norway and in the nited Kingdom; radio-noise measurements were collected in Canada. A summary of that bservation is tabulated here and the results support the first statement made above. *Subject eadings:* **1. Solar radio-ultraviolet radiation relationships 2. Radio frequency radiation om sun.**—*N.N.*

10.8—241 551.509.313:551.521.18:551.521.31

Kaplan, Lewis D. (*Dept. of Met., M.I.T.*), **A method for calculation of infrared flux for use numerical models of atmospheric motion. 1958?** 18 p. fig., 2 tables, 17 refs., 36 eqs. limeo. **DWB** (M21.61 K17me)—The pressure-scaling method to determine the flux of infra-d radiation in the atmosphere is reviewed, and the assumptions inherent in the method are scussed from the point of view of use in studies of atmospheric motions. A more accurate ethod, which enables the temperature dependence of the absorption coefficient and the exact ie shape to be taken into account, is then outlined. A matrix can be constructed from which e infrared heating terms in the equations of motion can be introduced into numerical models the atmosphere with a machine computation time equal to or less than the time required to ake the hydrodynamic computations. *Subject Headings:* **1. Infrared radiation flux 2. bsorption coefficients 3. Radiation factors in numerical forecasting models.**—*Author's stract.*

10.8—242 551.521.326

Krasovskiĭ, V. I., **Priroda izmeneniĭ intensivnosti emissiĭ zemnoĭ atmosfery.** [The nature variations in the intensity of emission of the earth's atmosphere.] *Akademiia Nauk SSSR, vestiia, Ser. Geofiz.*, No. 5:664–669, May **1957.** 10 refs., 19 eqs. **DLC**—In this analysis of e possible original causes of variations in the intensity of emissions of the night sky the author scusses the following: variation or exhaustion of initial products in the zone of reaction such as H and the roles of temperature, pressure, subsonic waves from the troposphere and solar diation and mixing of the earth's atmosphere. *Subject Heading:* **1. Night sky emission eories.**—*Author's abstract* (*I.L.D.*).

10.8—243 551.521.326

Nakamura, Junji (*Dept. of Physics, Univ. of Tokyo, Japan*), **Latitude effect of night air-ow.** *Journal of Geophysical Research*, Wash., D. C., 62(3):487–488, Sept. **1957.** fig. **DLC** As a result of night airglow observations on the "Soya" (J.A.R.E.I.) Expedition which left kyo Nov. 1956, the latitude variations in airglow intensity on the outward and homeward yage are presented graphically and discussed. A minimum intensity shows up at the geo-aphical equator. A seasonal trend is superimposed, since there was a difference of four nths between the two voyages. Three other minimums are found at 0°, +20° and −20° omagnetic lat. The author believes that the night airglow has two origins, UV rays and arged particles from the sun, the former being responsible for the minimum at the geographi-equator and for the seasonal variations, and the latter for the three minimums associated h the geomagnetic equator. *Subject Headings:* **1. Night airglow anomalies 2. Latitude ects on airglow.**—*M.R.*

10.8—244 551.521.326:551.507.362.1

Tousey, R. (*U. S. Naval Res. Lab., Wash., D. C.*), **Rocket measurements of the night air-w.** *Annales de Géophysique*, Paris, 14(2):186–195, April/June **1958.** 6 figs., 4 tables, 10 s. French and English summaries p. 186. **DLC**—Direct measurements of the altitude of

the night airglow conducted from rockets are reviewed. There have been four successfu flights. The maximum of the 5577 Å layer was found to lie near 98 km: the sodium layer peak from three flights were 85, 93 and 95 km. An ultraviolet airglow in the region 2600 to 2900 Å presumed to be O_2 radiation in the Herzberg bands, was observed with distribution similar t the 5577 Å layer. Some data have been obtained for the continuum, certain OH bands, an the 6300 Å line of oxygen, but these results are less clear cut. *Subject Headings:* **1. Rocke measurement of night airglow 2. Night airglow distribution with height.**—*Author's abstract*

TEMPERATURE

See also: **Frost damage to fruit trees** (Kemmer, Steckel), 10.8–118; **Irrig. effect** (Chudnovskiĭ), 10.8–120; **Cold Summer** (1816) **Eng. and N. Eng.** (Hoyt), 10.8–139; **Frost warning services** (Schnelle), 10.8–177; **Heat exchange sea-atmos.** (Fritz), 10.8–205; **Frost penetration in highways, Alaska** (Carlson, Kersten), 10.8–253; **Soil freezing studies** (Haley), 10.8–254; **Frost penetration in highways** (Linell), 10.8–255; **Cumulus cloud formation** (Parczewski), 10.8–294; **Sunspot-temp. rel., C. Europe** (Dines), 10.8–345.

10.8—245 551.524.4:551.577.3(54

Howe, G. Melvyn, **Climatic change in the Indian subcontinent.** *Geographical Review* N. Y., 45(3):425–428, July **1955. DWB, DLC**—The author reviews the statistical studies o rainfall and temperature trends in the Indian subcontinent by K. Pramanik and P. Jagan nathan, **Climatic changes in India: 1. Rainfall, 2. Temperature** (*Indian Journal of Meteor ology and Geophysics*, V. 4: 191–309, 1953 and 5: 29–47, 1954; *see* 6.1–274, Jan. and 6.6–229 June 1955, *MAB*). In the review the use of the median instead of the mean in the case of ab normal distributions is suggested, and mention is made of earlier studies to correlate rainfa and temperature changes with meteorological events elsewhere such as the association of grea droughts in India with excessive winter and spring snowfalls in the Himalayas and the Hind Kush (H. F. Blanford), etc. *Subject Headings:* **1. Temperature trends 2. Rainfall var ations 3. Statistical studies 4. India.**—*I.L.D.*

UPPER AIR TEMPERATURES

See also: **Upper air temp. charts, N. Hemisphere** (Wege et al.), 10.8–21; **Upper air temp. and contrails** (Roulleau), 10.8–295.

10.8—246 551.524.7:551.547:551.510.5

Krishnan, A. (*Met. Office, Poona*), **Some statistical relationships in upper air temperature and pressures over Agra.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(3):267–27 July **1958.** fig., 5 refs. **DWB, DLC**—In temperate latitudes, definite relationships have bee established between the upper air temperatures in the troposphere and the stratosphere, t general pressure distribution in the troposphere and the level of the tropopause. Dines (191 worked out many correlation coefficients and found that when a low pressure area passes acro the British Isles of Europe, (1) the temperature of the air column from 1 to 9 km also falls, (the value of height of tropopause decreases and (3) the temperature in the stratosphere increase As the depression moves away, (a) temperature in the troposphere increases, (b) the height the tropopause increases and (c) the temperature in the stratosphere decreases. Working wi Indian (Agra) data, Harwood (1921) found that the upper air pressure has a greater cor spondence with the temperature than the surface pressure, the nature of this correspondenc being in the same direction as that of pressure in Europe. Later, Gopal Rao (1931) made analysis of the relation between temperature and pressure at the same level over Agra in win and the monsoon, and found high positive correlation between pressure and temperature fr 2 to 10 gkm in winter and 6 to 14 gkm in the monsoon. For Agra, Chiplonkar (1936), furth found that there is no correlation between surface pressure and upper air temperature in win while there is a negative correlation in other months. Following a graphical method, he a found that low pressures from 2 to 10 gkm are associated with high temperatures at and abo 16 gkm and vice versa in winter, while low pressures from 6 to 16 gkm are associated with h temperatures from 16 to 20 gkm in other months. Bannon and Gilchrist (1956) evaluate

eries of correlation coefficients for 4 stations, viz., Lerwick, Larkhill, Arctic Bay and Aden, in rder to find out for what range of latitudes the model found out by DINES is applicable to the tmosphere, and the relative merits of the model for different latitudes and seasons, and to find ow high in the stratosphere the model is applicable. The object of this note is to find out vhether in Agra there exist relations between upper air temperatures and tropopause pressures nd between upper troposphere and lower stratosphere analogous to those for temperate latiudes. *Subject Headings:* **1. Upper air temperature-pressure correlation 2. Upper air pressure distribution 3. Tropopause height-pressure-temperature correlations 4. Agra, India.**—*Author's abstract.*

10.8—247 551.524.7(7,988):551.508.822 551.557(7,988):551.508.822

Lowenthal, Marvin and Arnold, A., **High altitude radiosonde flights, January 1955.** *U. S. Signal Research and Development Lab., Ft. Monmouth, N. J., USASRDL Technical Report,* 962, April 28, **1958.** 45 p. 8 tables, 14 refs., 25 figs. Reproduced from typescript. **DWB** M(055) U582us 1962)—Upper air data to 100,000 ft from five locations: Patrick AFB, Fla.; Belmar, N. J.; Chanute AFB, Ill.; Goose Bay, Labrador; and Narssarssuak, Greenland, are nalyzed for the month of Jan. 1955. An abrupt change in the stratospheric winds occurred ear the middle of the month. The two wind regimes are analyzed and discussed. The synopic situation leading to the monsoon change is described. Mean stratospheric temperatures nd winds are shown and the seasonal differences discussed. Within the limits of the available ata, diurnal variations in temperatures are described. Diurnal variation of the winds could ot be ascertained at this time. *Subject Headings:* **1. High altitude radiosonde flights 2. Upper air winds 3. Upper air temperatures 4. North America 5. Greenland.**—*Authors' bstract.*

10.8—248 551.524.7:551.588.2

Pava, Roland, **Diferența de temperatură dintre munte şi atmosfera libéra (Vîrful Omul-Bucuresti-Băneasa).** [Temperature difference between mountain and free atmosphere (Virful Omul-Bucharest-Baneasa.] *Meteorologia şi Hidrologia,* Bucharest, 1(1):25–31, Oct. **1956.** 8 gs., 3 tables, 10 refs. **DWB**—Monthly average temperatures (1941, 1950 and 1951) obtained t Virful Omul Mountain Station, and at the same altitude (2504 m) at Bucharest-Baneasa erological station are presented, as well as a graph of the annual variation of the temperature ifference between the two stations, and data on the correlation of this temperature difference ith wind speed and direction and cloudiness. The average temperature is 2°C lower on the ountain which agrees with findings on other mountains. *Subject Headings:* **1. Temperature omparisons mountain-free atmosphere 2. Vîrful Omul, Romania 3. Bucharest-Baneasa, omania.**—*G.T.*

10.8—249 551.524.7:551.588.2

Taylor, R. J. (*Div. of Met. Physics, C.S.I.R.O. Aspendale, Vic.*), **Thermal structures in the owest layers of the atmosphere.** *Australian Journal of Physics,* Melbourne, 11(2):168–176, une, **1958.** 4 figs., 4 tables, 10 refs., eqs. **DLC**—An analysis has been made of a number of ecords of simultaneous fluctuations of temperature at four heights. The results show that the orrelation between temperatures at two heights is greatest when the records are displaced elatively to each other, so that earlier points in the upper record are considered together with ater points in the lower, by an amount depending on the mean wind speed difference between he two heights. The correlation increases with height relatively to what would be expected n a locally isotropic turbulence. This and other evidence points to the existence of organized hermal structures of considerable vertical extent which are superimposed on a background of andom turbulent disturbances. It is probable that these structures represent convection lumes. *Subject Headings:* **1. Turbulent transfer of heat 2. Thermal structure of lower tmosphere 3. Microclimatic temperature profile.**—*Author's abstract.*

10.8—250 551.524.73:551.513.2:551.583

†Fay, Richard (*U. S. W. B.*), **Some variations in European climatic temperature.** *Journal Meteorology,* Boston, 15(5):467–474, Oct. **1958.** 11 figs., 18 refs. **DWB, DLC**—An attempt made to depict mean circulation patterns associated with observed-temperature climate

changes in northwest Europe during the period 1780–1930. Use is made of observed pressure gradients associated with warm and cold seasons and of computed annual wind directions at several stations. Results are presented as possible winter and summer mean circulation patterns at 30-yr intervals. *Subject Headings:* **1. Climatic changes 2. Temperature changes 3. Circulation patterns 4. Northwest Europe.**—*Author's abstract.*

SOIL TEMPERATURE

See also: **Soil temp. eff. on corn yield, Ames, Iowa** (Riley), 10.8–115; **Corn cultivation and germination, Moscow Oblast** (Chirkov), 10.8–119; **Irrig. effect** (Chudnovskiĭ), 10.8–120; **Radiation data, Hungary** (Dobosi), 10.8–228.

10.8—251 551.525

†Blanc, Milton L., **Climatological investigation of soil temperature.** *World Meteorological Organization, Technical Note*, No. 20; WMO [Pub.] No. 72, TP. 28, **1958.** 18 p. 2 figs., tables, 35 refs. French, Russian and Spanish summaries. **DWB, DLC**—Based on Document CC1-II/42 (which was presented at the 2nd Session of the Commission for Climatology, Washington, Jan. 1957), the author examines in some detail the suggestions in Resolution 51 (Exec. Comm.-IV). An account of the most important research conducted in the climatological investigation of soil temperature is presented, with particular attention given to the following: 1) Physical relationships, 2) Biological relationships, 3) Soil moisture relationships, 4) Observational techniques (depth and frequency, soil characteristics and cover), and 5) Instruments. In emphasizing the relationship of soil temperatures to soil moisture, the author also offers the results of his study as an aid to administrators of meteorological services in developing a program involving a substantial investment in equipment and personnel. In addition, the need of greater uniformity or standardization in methods of observation is stressed. *Subject Headings:* **1. Soil temperature research.**—*R.P.*

10.8—252 551.525:631.43:536.24

Boldizsár, T. (*Technical Univ., Sopron, Hungary*), **New terrestrial heat flow values from Hungary.** *Geofisica Pura e Applicata*, Milan, 39:120–125, Jan./April **1958.** 3 figs., 2 tables, 9 refs. **DLC**—Temperature and conductivity measurements show that in the southern part of Transdanubia (the part of Hungary which lies west of the Danube) the heat flow is about 2–2.4 $\cdot 10^{-6}$/cal/cm² sec. East of the Danube, in the Hungarian Plain, estimates are even higher, and vary between $2.3 \cdot 10^{-6}$ and $2.8 \cdot 10^{-6}$ cgs. The gradient of temperature is everywhere quite high, 5.0 and $5.8 \cdot 10^{-4}$ deg. C/m, respectively, on the average. Thus, at a depth of 1000 m, the virgin rock temperature is about 60–70° C, at 2000 m about 110–130°C. *Subject Headings:* **1. Heat flow 2. Soil heat conductivity 3. Hungary.**—*Author's abstract.*

10.8—253 551.525:551.524.37(798

Carlson, Harry, (*Chief, Permafrost Div., St. Paul District, Corps of Engineers*) and Kersten, Miles S. (*Assoc. Prof., Civil Engineering, Univ. Minnesota*), **Calculation of depth of freezing and thawing under pavements.** *National Research Council, Wash., D. C., Highway Research Board Bulletin*, 71:81–98, **1953.** 5 figs., 6 tables, 3 refs., eqs. **Discussion** by Harl P. Aldrich, Jr. and Henry M. Paynter, p. 95–98. 3 figs., 4 eqs. **DWB** (M25.5 N277so)—A description is given of the test installations of thermocouples measuring ground temperatures under the runway pavements at three sites in Alaska. A comparison is made of the results of calculation by the theoretical method using soil data, air temperature data and predetermined thermal conductivity values with that of thermocouple reading. The conclusion is that the theoretical method is a useful tool for making estimates of frost conditions in runway sections. *Subject Headings:* **1. Frost penetration in highways 2. Soil temperature calculations 3. Alaska. I. Aldrich, Harl P., Jr. II. Paynter, Henry M.**—*N.N.*

10.8—254 551.525:551.524.37

Haley, James F. (*Asst. Chief, Frost Effects Lab., New Eng. Div., Corps of Engineers*), **Cold room studies of frost action in soils: a progress report.** *National Research Council, Wash., D. C., Highway Research Board, Bulletin*, 71:1–18, **1953.** 9 figs., 2 tables, 8 refs. **DWB** (M25.

N277so)—The Frost Effects Laboratory, New England Division, Corps of Engineers, presents in this paper a progress report of cold-room studies of frost action in soils as investigated between Feb. 1950 and Oct. 1952. This material is intended for the improvement of engineering design, construction and evaluation criteria for pavements and other structures constructed on soils subject to seasonal freezing and thawing. *Subject Headings:* 1. **Frost penetration in soil** 2. **Soil freezing studies.**—*N.N.*

10.8—255 551.525:551.524.37

Linell, Kenneth A., (*Chief, Frost Effects Lab., New England Div., Corps of Engineers*), **Frost design criteria for pavements.** *National Research Council, Wash., D. C., Highway Research Board, Bulletin*, 71:18–32, **1953,** 11 figs., 5 refs. **DWB** (M25.5 N277so)—This is a progress report on frost design criteria as developed in the Frost Effects Laboratory, New England Division, Boston, Mass., for the Airfields Branch, Engineering Division, Military Construction, Office of the Chief of Engineers, U. S. Army. A map of the U. S. shows the approximate southerly limit of area where frost may be expected to penetrate pavements and base to a depth of at least 12 in. on the average of 1 year in 10. Examples of pavement designs as well as the effects of frost on soils are given. *Subject Heading:* 1. **Frost penetration in highways.**—*N.N.*

WATER TEMPERATURE

See also: **Bathythermograph processing manuals** (Richmond), 10.8–34; **Cold water year, Pacific Ocean, 1955** (Rodewald), 10.8–87; **Heat exchange sea-atmos.** (Fritz), 10.8–205.

10.8—256 551.526.6

Mileĭko, G. N., **Raschet poter' tepla poverknost'iu Barentseva moria dlia opredeleniia temperatury vody i kromki l'da.** [Calculating heat loss from the surface of the Barents Sea for the purpose of determining water temperature and ice limit.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 57:60–82, **1957.** 6 figs., 6 tables, 10 refs., eqs. **DLC**—Using the characteristics of the interrelationship of heat processes observed at the water-air interface, the author computed the position of the ice limit and the water temperature of the Barents Sea during the fall-winter period on the assumption that, for the Barents Sea with its extremely limited ice movement and the relatively small water advection of heat, the lowering of water temperature is proportional to the loss of heat in the active layer. By means of the equation of heat balance it is shown that during the winter the greatest heat losses are observed in Jan.–Feb.; that the heat losses by convective heat exchange, effective radiation and evaporation are on the average equal to each other in winter; and that the role of convective heat exchange on the total heat loss from Oct. increases, reaching 40% in March. The loss of heat through the surface can be computed by the equation

$$\Delta Q = 48\ (t_w - t_a) + 100.$$

The air temperature in sea areas where adequate observational data are lacking is calculated by the equation

$$\Delta t_a = \sqrt{0.28\ (t_{w_n} - t_{a_1})\ \tau + 1.79} - 1.34$$

(where t_{wn}—water temperature at a given point of the sea in the direction of air movement, t_{a1}—air temperature at a shore station and τ—time of travel of air over sea in hours). The effect of heat insulation of ice as a function of its thickness (h) on the slowing down of warming of the atmosphere is determined by the "index of heat insulation," i.e., $k = 1–0.012h$. The formula for calculating the change of air temperature in winter is

$$\Delta t_a = [\sqrt{0.28\ (t_{w_n} - t_{a_1})\ \tau + 1.79} - 1.34]\ (1 - 0.012h).$$

The temperature of the water layer where convective mixing occurs, is determined by the formula:

$$t_{w_n} = t_{w_1} - \sum_{1}^{n-1} \Delta i_w = t_{w_i} - \left(\frac{\Delta Q_1}{cH_1} + \frac{\Delta Q_2}{cH_2} + \frac{\Delta Q_3}{cH_3} \cdots + \frac{\Delta Q_{n-1}}{cH_{n-1}} \right).$$

Calculation of water temperature on the Kola meridian from April 11, 1947 to July 1, 1948, examples of actual and computed temperatures of the convective mixing layer for different periods, etc. are presented in tables and graphs. *Subject Headings:* **1. Heat loss of water surfaces 2. Sea temperatures 3. Barents Sea.**—*I.L.D.*

10.8—257 551.526.8

Szaflarski, Józef (*Kraków*), **Warstwa tzw. przedwiosenna w termice wód jezior tatrzańskich.** [The pre-spring time layer in the thermics of the lakes of the High Tatras.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):229–239, **1956.** 2 figs., tables, 22 refs. Russian and French summaries p. 238–239. **DWB, DLC**—A layer of water at 0 to 1°C is found above the winter warm water layer and under the ice; it is called the pre-spring layer, and originates in the melting snow and ice on the slopes above the lake. *Subject Headings:* **1. Lake temperatures 2. Limnology 3. Tatra Mountains, Poland.**—*M.R.*

PRESSURE AND WIND

PRESSURE

See also: **Mean stratospheric charts, N. Hemisphere** (Wege et al), 10.8–21; **Pressure variations in a baroclinic atmos.** (Monin), 10.8–162; **Upper air temp.-press. correlation, Agra** (Krishnan), 10.8–246; **Wind deviation and num. forecast.** (Solberg), 10.8–264.

10.8—258 551.547.2:551.571.3

Rao, K. Nagabhushena (*Met. Office, Poona*), **Contribution of the humidity term in the formula for reduction of pressure to sea level.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):323–332, Oct. **1958.** 3 figs., 2 tables, ref., 10 eqs. **DWB, DLC**—Towards the end of 1954, World Meteorological Organization brought out a Technical Note on the **Reduction of atmospheric pressure (Preliminary Report on problems involved)** *Technical Note*, No. 7, *WMO*, No. 36, TP 12, **1954,** (*see* 6.9–12, Sept. 1955, *MAB.*) This consists of two parts. Pt. I gives a summary of the methods used by meteorological services for reducing pressure to mean sea level. Pt. II is the report prepared for the C.I.M.O. Working Committeee II on **Reduction of pressure** by the Chairman. According to this "A rather chaotic situation exists regarding methods used for pressure reduction." Of the eight points mentioned in the summary review of practices of Members regarding pressure reduction, one of them relates to the correction for humidity. It has been indicated by an example that there is no more justification for neglecting the humidity correction than for neglecting the lapse rate correction in those cases where the dew point is moderate or high. In taking the mean integral virtual temperature of the air column, T_{mv}, the note introduces a new form which appears to be used by the U. S. Weather Bureau and Canadian Meteorological Service. The expression suggested for mean virtual temperature T_{mv} is

$$T_{mv} = T_s + \frac{aH\rho}{2} + e_s Ch.$$

The last term $e_s Ch$ on the right hand side denotes the contribution due to humidity. It is also mentioned in the second part of the Technical Note that this form is an excellent approximation for T_{mv}. This approximation, however, is based on two principal assumptions. The first is the constancy of the lapse rate and the second is that the variation of vapor pressure with height is in accord with HANN's well-known formula. The purpose of the present study is to examine the order of humidity correction due to variation of vapor pressure in space and time and to see to what extent the new form suggested may be regarded as an improvement over existing practice. The suggestion that surface vapor pressure e_s may be represented by surface temperature T_s by means of e_s, T_s curves is also considered. *Subject Headings:* **1. Pressure reduction 2. Humidity effect in pressure reduction.**—*Author's abstract.*

WIND

See: **Wind computers** (Gringorten), 10.8–124.

GUSTINESS AND TURBULENCE

See also: **Meteor trail radio transmission** (Booker, Cohen), 10.8–130; **Ionospheric turbulence** (Booker), 10.8-131; **Pilot balloon ascension rates** (Sinha), 10.8–149; **Num. weather forecast. and turb. friction** (Reiser), 10.8–167; **Stack met.** (Bosanquet), 10.8–183; **Atmos. turbulence eff. on radioactivity** (Garbaliauskas), 10.8–201.

10.8—259 551.551:551.576

Abramovich, K. G., **Kharakteristika turbulentnosti atmosfery v dni s nizkoĭ oblachnost'iu.** Characteristics of atmospheric turbulence on days with low cloud cover.] *Meteorologiia i idrologiia*, Leningrad, 9:3–10, Sept. **1958.** 3 figs., 3 tables, 5 refs. **DWB, DLC**—Using alloon soundings made on days with low cloud cover and during the cold seasons of 1955–1956 nd 1956–1957, the author investigated turbulence at lower levels with the aid of the Richardon number. The distribution of turbulence in layers with a thickness of several tens to hundds of meters (a total of 1652 layers) was examined. Computations of mean values of Ri for fferent combinations of γ (temperature gradient), and $\frac{dv}{dz}$ indicate that for temperature gradiits greater than the dry adiabatic, the atmosphere is turbulent ($Ri < 1$) regardless of magnides of wind gusts. At values of γ from 1.0 to 0.5°/100 m $Ri < 1$ only when $\frac{dv}{dz}$ is 1 m/sec om a 100 m or more. When the variation of temperature with height is reduced, or when othermy exists, the vertical wind gust is not less than 2–3 m/sec for a 100 m; in inversions the ind gusts should be correspondingly greater. The decrease of the frequency of *Ri* from lower higher layers occurs for values of $Ri < 0.25$ and its increase for greater values of *Ri*. Within e limits of the lower 100 m the frequency of contiguous gradations of *Ri* is from 0.26 to 2; thin the limits of the lower kilometer, the frequency of *Ri* increases from 0.5 to 4 and even om 10 and higher. Analysis of the frequency of *Ri* according to layers indicates that $Ri \leq 1$ curs most frequently under clouds (73%), in fog (67%), and in clouds (62%). In almost lf of the instances these values occur in the lower kilometer layer of the atmosphere and in the sence of clouds or fog. The greatest frequency of $Ri > 4$ is observed under clouds and beeen two cloud layers, if one is large and above a fog. The degree of turbulence can be deterined by estimating the complex of temperature gradient and wind vector in each layer. *ubject Headings:* **1. Low level turbulence 2. Low cloud effect on turbulence.**—*I.L.D.*

10.8—260 551.551.5:551.557

Benton, George S. and Kahn, Arthur B. (*both, Johns Hopkins Univ.*), **Spectra of large-scale mospheric flow at 300 millibars.** *Journal of Meteorology*, Boston, 15(4):404–410, Aug. **1958.** ., 3 tables, 16 refs., 3 eqs. **DWB, DLC**—Data at 300 mb for Jan.–Feb. and July–August, 49, are used to compute spectra of atmospheric turbulence as a function of wave number along rious latitude circles. Power spectra are computed for the zonal and meridional wind, and spectra for the meridional transfer of angular momentum, dry enthalpy, and kinetic energy. otal spectra are computed daily, and for each season the mean total spectrum is divided into o parts: the spectrum of the seasonal mean flow, and the mean seasonal spectrum of the rturbations. The general characteristics of the power and cospectra are discussed. It is own, for example, that the spectrum of the mean seasonal flow dominates at low wave numrs, while the mean spectrum of the perturbations is more important at higher wave numbers. e day-to-day variation of the total spectra is also considered. It is found that for power ectra the specific deviation is quasi-constant at all wave numbers, latitudes, and seasons. method is presented for refining the variance analysis by separating out the interaction varice between the mean flow and the perturbation field. *Subject Headings:* **1. Upper air turbnce 2. Turbulence spectrum.**—*Authors' abstract.*

10.8—261 551.551

†Blackadar, Alfred K.; Buajitti, Kajit; Newstein, Herman and Ooyama, Katsuyuki, **rdies of wind structure in the lower atmosphere.** N. Y. Univ. College of Engineering. Rerch Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1368, Final Report, ay **1957.** 164 p. figs., tables, 84 refs., eqs. **DWB** (M51 M532st)—This manual gives first

the characteristic velocity profile in the wind below 3000 ft as observed at night. In the secon part, an analysis is made of the distribution of stress and eddy viscosity. The rest of the boo is devoted to the study of low-level wind maximum at night and its causes, as well as on differer types of related problems that have been investigated recently. Contents of the book are a follows: Blackadar, Alfred K., **Boundary layer wind maxima and their significance for th growth of nocturnal inversions,** p. 1–26. Blackadar, Alfred K., **Field of stress and eddy viscos ity in the lower portions of the planetary boundary layer at O'Neill, Nebraska, August 31 September 1, 1953,** p. 26–44. Buajitti, Kajit and Blackadar, Alfred K., **Theoretical studies c diurnal wind structure variations in the planetary boundary layer.** p. 45–79. Ooyama, Ka suyuki, **Study of diurnal variations of wind caused by periodic variation of eddy viscosity** p. 80–135. Newstein, Herman, **Theoretical study of the Meso-high through application of th method of characteristics,** p. 136–164. *Subject Headings:* **1. Wind structure studies 2. Lo wind studies. I. Miller, James E.** (*ed.*).—*N.N.*

10.8—262 551.551:551.55

Buz, A. I., **Izmenenie skorosti vetra v nizhnem sloe atmosfery.** [The change in win in the lower layer of the atmosphere.] *Lietuvos TSR Mokslų Akademija. Geologijos Geografijos Institutas, Moksliniai Pranešimai,* 5:31–39, **1957.** 4 figs., 5 tables, 5 refs., 16 eq **DWB**—Analysis of aerological records shows that the change of wind velocity depends in cor siderable degree on vertical gradient of wind velocity. This dependence apparently is cond tioned by diurnal variation of turbulence coefficient in lower layers of the atmosphere. Th article gives a new way to determine coefficient of turbulence. *Subject Headings:* **1. Win velocity changes 2. Vertical wind velocity gradient 3. Turbulence coefficient determinatio** —*Author's abstract.*

10.8—263 551.551.5:551.5

Koo, Chen-chao (*Inst. of Geophysics and Met., Academia Sinica*) and Fan, Yung-shan (*Dept. of Physics, Peking Univ.*), **A statistical study of eddy transfer of vorticity in the larg scale time-averaged motion.** *Acta Meteorologica Sinica,* Peking, 29(1):16–23, Feb. **1958.** figs., 8 refs., 2 eqs. In Chinese; English summary p. 23, **DWB**—Using the upper air data f Feb. 1956, some statistical behavior of the various eddy transfer terms in the time-averag vorticity equation for a two-layer model is studied. According to the analysis for five statio (Peking, Irkutsk, Moscow, Paris, Oslo) for various time intervals, up to one month, it is fou that the eddy transfer term is not necessarily smaller than the mean transfer term, and th not negligible. It is also pointed out that there exists no simple relation between these t terms. In this respect, the time-averaged equation of vorticity without eddy term is not co venient for the work of numerical forecasting. *Subject Headings:* **1. Eddy transfer calculatio 2. Vorticity equations.**—*Authors' abstract.*

HORIZONTAL DISTRIBUTION AND WIND VARIATIONS

See also: **Monsoon circulation, E. Asia** (Sorochan), 10.8–218.

10.8—264 551.552:551.542.1 551.509.3

Solberg, H., **On the relation between pressure field and paths of moving air particl** *Meteorologiske Annaler,* Oslo, 4(5):55–86, **1956.** 4 refs., numerous eqs. **DLC**—General crite for the deviation of the actual wind from the geostrophic wind are presented, keeping in mi possible applications to numerical forecasting. The acceleration leading to these deviation first assumed to be a linear function of the time, then more general cases are treated and, fina a new exact method is proposed on the basis of a variable wind field. Applications to the t tion of a frictionless, autobarotropic fluid are discussed for straight parallel, divergent, conv gent and circular paths. The equations of motion are discussed in a general form. Series a graphical solutions are developed. *Subject Headings:* **1. Wind deviation 2. Equations motion 3. Numerical forecasting.**—*A.A.*

10.8—265 551.553(52)

Saito, Renichi, **Probability of occurrence of high wind speed (High gales of Japan, Pt. 3).** *ournal of Meteorological Research*, Tokyo, 9(7):529–532, July **1957.** 2 figs., 8 eqs. In apanese. **DWB, DLC**—A nomograph in parameters of percentage of safety, serviceable dura- on of designing structure and return period is prepared from their logarithmic relation. The nnual maximum wind speed distribution does not fit with Poisson's rule but with Fisher- ippet's theory. Serviceable safety value and return period can be obtained using the annual aximum wind speed distribution chart. *Subject Headings:* **1. Wind speed maximum 2. Vind velocity distribution.**—*J. Woo*

10.8—266 551.553.21(522.3)

Inagaki, T., **On the strong monsoon in winter season at Izuhara.** *Journal of Meteorological Research*, Tokyo, 9(10):740–745, Oct. **1957,** 7 figs., 6 tables, ref. In Japanese, English ummary p. 740. **DWB, DLC**—In winter season a strong monsoon prevails in the Tsuchima traits. In this investigation, 202 examples of strong winds in the winter monsoon season Nov.–March) are compared with 155 examples of strong winds in the warm season (April– ct.). The principal results are as follows: 1) The durations of prevailing strong monsoon are hown in Fig. 2 and are rather shorter than those of the warm season. 2) The pressure patterns t the time when the strong monsoon is breaking out may be classified as follows: (1) Frontal ype, (2) Frontal type with low, (3) Sub-monsoon type, (4) Northeasterly wind type, (5) Out- reak type of Middle China High. Among these types, the second is extremely numerous. n this type, the positions of the center of high and low at the beginning of prevailing monsoon nd positions of low at the end of prevailing monsoon are plotted in Fig. 3. These positions re considerably concentrated. 3) The frequency of the beginning time and the ending time of revailing monsoon are shown in Fig. 4, which shows that a diurnal change of wind must be ully considered by forecaster in predicting the beginning time and the ending time of a strong ionsoon. *Subject Headings:* **1. Winter monsoon circulation 2. Winter monsoons 3. zuhara, Japan.**—*Author's abstract.*

10.8—267 551.553.8(492)

Rijkoort, P. J., **Eénling- en tweeling-stormen.** [Individual- and twin storms.] *Hemel n Dampkring*, The Hague, 56(5):90–97, May **1958.** 2 figs., 6 tables. **DLC**—After the dis- strous storm over the Netherlands in 1953 a thorough study has been made about storms from synoptic, oceanographic and climatological viewpoint. Before Christmas 1954, two storms, ne immediately after the other, moved over the Netherlands, and received the name of twin orms. The paper has a climatological and statistical character. The author gives the efinition of the storm, the storm frequency, storm season, and discusses the chances of twin orms. *Subject Headings:* **1. Wind storms 2. Netherlands.**—*A. V.*

SPECIAL WINDS AND WIND EFFECTS

See also: **Ocean-atmos. interaction** (Redfield et al.), 10.8–3; **Ocean-atmos. interaction, No. Atlantic** (Timonov), 10.8–89; **Wind effects on flying conditions, Fornebu** (Dokken), 10.8–112; **Saline wind damage, Japan,** 10.8–179; **Trade winds and climatic changes** (Bjerknes), 10.8–219.

1018—268 551.555.8(438):551.311.3

Strzemski, Michał, **Efekty erozji wietrznej gleb na terenie południowo-wschodniej Polski lutym 1956 r.** [The effects of aeolian erosion of soils in southeastern Poland in Feb. 1956.] *rzegląd Geograficzny*, Warsaw, 29(2):371–374, **1957.** 2 tables. Russian and English sum- aries p. 374. **DWB, DLC**—The dry soil surface in the region of Puławy was dispersed by the rong winds prevalent during the frosty weather from Feb. 18 to 21, 1956. Intense aeolian osion took place in the area of sand dunes, where material was removed to distances of from to 12 km. In the zone bordering on the denuded sands, the quantity of aeolic sandy deposit some places exceeded 10,000 tons/sq km, while over loess areas it amounted to 600 tons/sq km. he tables presented illustrate the meteorological conditions prevailing in Puławy from Feb. to 25, 1956, and the quantity and mechanical composition of sediment. *Subject Headings:* **Wind erosion 2. Puławy, Poland.**—*Author's summary.*

10.8—269 551.556:634.94(437

Křivský, L., **Windfahnenbäume und Wind auf der Milešovka (Donnersberg).** [Wind vane trees and wind at Milešovka (Donnersberg).] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), **1957.** 2 p., 8 figs., refs. **DWB**—A method is described for determining prevailing wind direction with the aid of vane trees by comparing the prevailing wind direction observed at the Milešovka Observatory with the direction wind vane trees (spruce and larch) growing in the immediate vicinity. An objective method for determining the prevailing wind direction by means of wind vane trees is described and the results of such measurements are presented in a diagram. The prevailing wind direction as measured by means of wind vane trees is between 280° and 288°, as measured by the wind rose it is 284°. Illustrations and diagrams of wind vane trees are presented. *Subject Headings:* **1. Wind effects on trees 2. Prevailing wind determination from trees 3. Milešovka Observatory, Czechoslovakia.**—*I.L.D.*

10.8—270 551.556:551.311.31(489

†Kuhlman, Hans, **Sandflugt og klitdannelse.** [Sand drift and dune formation.] *Geografisk Tidsskrift*, Copenhagen, 57:1–19, **1957.** 14 figs., table, 43 refs. English summary p. 17–18. Also his: **Kornstørrelser i kilt- og strandsand.** [Grain sizes of dune and beach sand.] *Ibid.*, 20–56, **1957.** 6 figs., 7 tables, 52 refs. English summary p. 52–54. **DWB**—Mechanism of sand drift and dune formation along the beach of Skallingen, Denmark were studied in the summers of 1954 and 1955. Graphical and tabulated data on precipitation, humidity, wind velocity, condition of surface, and vegetation in relation to and influence on various sizes of the grains are discussed. *Subject Headings:* **1. Sand dune formation 2. Wind velocity effects on dune formation 3. Skallingen, Denmark.**—*W.N.*

10.8—271 551.556.

Kreutz, W. and Walter, W., **Windschutzwirkung in Abhängigkeit von der Breite und Durchlässigkeit des Hindernisses.** [Wind protection in relation to the size and structure of the obstacle.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 105(3):271–282, March **1958.** 26 figs. (mostly photos). **DLC**—In practice, the best results are obtained with obstacles placed on two lines. When placed on 3 or 4 lines, the efficiency is lowered. In all cases it is preferable to employ incompletely closed obstacles in order to obtain the maximum of protection for a surfaces. *Subject Heading:* **1. Wind protection.**—*A.V.*

10.8—272 551.556.2(431.5

†Scultetus, Hans Robert, **Windschutz immer noch ein Problem: Stand der Windschutzfrage und Folgerungen daraus.** [Windbreaks still a problem: status of windbreaks and consequences thereof.] *Meteorologische Rundschau*, 11(1):23–28, Jan./Feb. **1958.** 8 figs., refs. **DWB, DLC**—Several studies on the effectiveness of windbreaks are summarized and the inconsistencies in the various measurements of their effectiveness made by various investigators are pointed out. These are attributed to the fact that they were carried out in different climatic regions during different seasons. Furthermore, since the reappearance of wind velocity in the lee of windbreaks is the result of kinetic energy, expressed in the degree of turbulence which depends upon the vertical gradient, the prevailing air mass must be considered in windbreak studies. The results of microclimatic measurements of wind velocities behind a strip of pine trees on a pasture between Bielefeld and Paderborn are reported. Data are presented showing that cold air reduces the field of influence of windbreaks while warm air increases it. The effect of air mass is confirmed by measurements with a Piche evaporimeter. The air mass frequency at Bremen Karlsruhe and Zurich is analyzed for the period 1954–1957 according to SCHERHAG's method and the corresponding effectiveness of windbreaks at various periods of the year is discussed. The studies of FRANKEN and KAPS which contradict the above results are mentioned and a suggestion for an investigation to determine the validity of the conclusions of the latter and of the author is proposed. *Subject Headings:* **1. Windbreak effectiveness 2. Air mass effects 3. West Germany.**—*I.L.D.*

10.8—273 551.556.4:382.28(569.4)

Barkai-Golan, R., **Study of air borne fungi in Israel.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), **1957.** 4 p. **DWB**—The results of collections of air-borne spores made in (1) Tel-Aviv during three successive years; (2) at various locations representing different climatic and geographic conditions; (3) at various altitudes up to 2000 m, made with an airplane; (4) over the Mediterranean at various distances from the shore between Haifa and Crete and (5) indoors. Quantitative data on spore counts on distribution by genera (*Hormodendrum, Aspegeillus, Penicillium, Alternaria, Actinomycetes*, yeasts, etc.) are given. *Subject Headings:* **1. Air-borne fungi 2. Spore distribution 3. Wind transport 4. Tel-Aviv, Israel.**—*I.L.D.*

UPPER AIR WINDS

See also: **Mean stratospheric charts, N. Hemisphere** (Wege et al.), 10.8–21; **Arctic met. and jet stream** (Reed), 10.8–56; **High level wind meas. techniques** (Lally, Leviton), 10.8–128; **Planetary waves in zonal currents** (Kao), 10.8–217; **Cyclone movements and transosonde trajectories, NW Pacific** (Arakawa), 10.8–221; **High alt. radiosonde flights, No. America and Greenland** (Lowenthal, Arnold), 10.8–247; **Turbulence spectrum** (Benton, Kahn), 10.8–260.

VERTICAL MOTION

See also: **Sonic anemometers** (Businger, Suomi), 10.8–160; **Precip.-vertical motion rel.** (Sanders), 10.8–207; **Vert. wind velocity grad.** (Buz), 10.8–262.

10.8—274 551.558.2

Emsalem, R. (*Paris*), **Le problème des composantes verticales de la vitesse du vent.** [The problem of the vertical components of wind speed.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 10(4):367–380, **1958.** 4 figs., 11 eqs. French, German and English summaries p. 366–368. **DWB, DLC**—Proceeding from the significance of the geostrophical hypothesis and the notion of the divergence, the author shows in which way a known relation, referring to large-scale divergence, can be developed on the basis of a total (from zero differing) divergence of the wind. The horizontal divergence usually remains, however, considerably larger in its absolute value than the total divergence. Applied to the geostrophic velocities, the proposed relation leads to a simple formula, which makes it possible to determine the spatial variations of the vertical wind component. In the second part, the author proceeds from the adiabatic hypothesis and examines a relation between the horizontal and vertical components of the velocity, the temperature gradient in vertical direction and in the direction of the horizontal projection of the trajectory. It can be concluded that the sign of this latter gradient is opposite to that of the vertical component of the wind. *Subject Heading:* **1. Vertical wind velocity calculation.**—*Author's summary.*

10.8—275 551.558.21:551.43

Orographic waves: form, forecasting and effect on aircraft. (Meteorological Office discussion). *Meteorological Magazine*, London, 87(1029):80078, March **1958.** figs., 18 refs., eqs. **DWB**—The Meteorological Office discussion was held at the Royal Society of Arts on Nov. 18, 1957. The nature and characteristics of orographic wave flow were discussed under the following topics: the "natural wavelength," the lee-wave flow, diurnal variations, effect of synoptic changes, effect of mountain shape and size, observations of wave phenomena, numerical study, and forecasting wave effects. *Subject Heading:* **1. Orographic waves.**—*N.N.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Vapor pressure charts** (Tunnell), 10.8–13; **Psychrometric tables, U.S.S.R.** (Savich), 10.8–37; **Glacial advances, Malaspina** (Sharp), 10.8–97; **Humidity eff. in pressure reduction** (Rao), 10.8–258; **Contrails and tropopause temp.** (Roulleau), 10.8–295.

10.8—276 551.571:551.573:551.577.11

†Drozdov, O. A., **Vlagooborot i problemy izmeneniia kolichestva osadkov.** [Moisture exchange and problems of changes in precipitation amount.] (In: Vsesoiuznoe Geograficheskoe Obshchestvo SSSR, **Voprosy Geografii.** Moscow, **1956.** p. 170–178. 24 refs.) **DWB, DLC** (G58.G35)—This is a review of the most important works found in Soviet and foreign literature dealing with the theoretical and practical aspects of the problem. It is shown that, in addition to adequate humidity and favorable conditions of air circulation, local evaporation plays a very important role as a factor in stimulating precipitation. *Subject Headings:* **1. Moisture exchange 2. Precipitation formation 3. Evaporation-rainfall correlations.**—*A.M.P.*

10.8—277 551.571:551.513.2

Starr, V. P. (*Mass. Inst. of Tech.*); Peixoto, José, P. (*Univ. of Lisbon, Nat. Met. Services of Portugal*) and Livadas, G. C. (*Univ. of Thessalonica*), **On the meridional flux of water vapor in the Northern Hemisphere.** (In: Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-1000, **Final Report,** Dec. 31, **1957.** p. 124–144. 4 figs., 3 tables, 10 refs., 6 eqs.) **DWB**—Maps of the meridional vertically integrated flux of atmospheric water vapor over the Northern Hemisphere for summer, winter and the entire year of 1950 are presented. These results are derived from all available meteorological soundings of humidity and winds. A corresponding set of three maps showing the average vertically integrated values of the moisture content are included. Tables and graphs of zonally averaged numerical values extracted from these maps are reproduced and discussed in the light of various meteorological considerations. *Subject Headings:* **1. Meridional flux of water vapor 2. Atmospheric water balance.**—*Authors' abstract.*

10.8—278 551.571.36(413.4)

Smith, R. C., **Abnormally low humidity in Scotland.** *Meteorological Magazine,* London, 87(1028):35–39, Feb. **1958.** 2 figs., table, 6 refs. **DWB**—The synoptic and upper air conditions from June 7–10 are discussed and data presented in a table and on a tephigram. A ridge lay northeast of Scotland and the dry air came from region of tropopause (24,000 ft at Lerwick) and descended *in situ* with a vertical velocity of 3 ft/min at first, and 2 ft/min on the last day. A mirage (inverted) appeared at Kinloss at 2045 h on June 10 as shown in drawing. Afternoon (1600 h) of June 10, 1956 a low humidity of 18% was recorded at Kinloss with a dew point fall from 46° to 21°F in 2 hours, at the Cairngorm Nature Reserve 8% r.h. was recorded at 1400 h. *Subject Headings:* **1. Low relative humidities 2. Record low humidities 3. Kinloss, Scotland.**—*M.R.*

EVAPORATION AND EVAPOTRANSPIRATION

See: **Potential evapotranspiration charts** (Thornthwaite et al.) 10.8–35; **Evap.-rainfall correl.** (Drozdov), 10.8–276.

CONDENSATION

See also: **Warm cloud seeding** (Braham et al.), 10.8–18; **Drop impingement on propellers** (Lewis, Ruggeri), 10.8–110; **Icing meas. tech.** (Goettelman, Poppoff), 10.8–126; **Cloud seeding, Leningrad** (Nikandrov), 10.8–175; **Ice crystal formation** (Solov'ev), 10.8–176; **Condensation nuclei-atmos. poll. estimation, Switzerland** (Bider), 10.8–182; **Nuclei vertical distrib.** (Kawano), 10.8–353.

10.8—279 551.574.1:551.594.21

Imianitov, I. M. and Chuvaev, A. P., **K voprosu ob osnovnykh protsessakh, vedushchikh k elektrizatsii v grozovykh oblakakh.** [Problem of basic processes leading to the electrification

of thunder clouds.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 67(129): 121–128, **1957.** fig., 2 tables, 16 refs. **DWB**—On the basis of investigations of the variation of the electrical properties of clouds during their development, the authors attempt to show the processes bringing about the electrification of thunderstorm clouds. The various mechanisms of electrification of clouds are summarized briefly. These include the following: electrification of clouds without additional sources of charge formation; electrification of clouds at the expense of the removal by small drops of charges induced by the field on large drops; electrification at the expense of the disintegration of drops in an electric field; and electrification at the expense of contact phenomena at the boundary ice-snow. The magnitude and distribution of electrical charges in thunderstorm clouds are discussed. It is shown that neither increase in water content nor thickness of clouds leads to the appearance of significant electrical fields; the latter increases when ice particles appear. Seeding with dry ice rapidly accelerates the electrification of cumulus clouds. Numerical data are presented on the magnitude of charges per meter length of a thunderstorm cloud, of charges in unipolarly charged clouds, and of the electrical moment of bipolar clouds, and on the increase in electrical field following seeding of clouds with dry ice. *Subject Headings:* **1. Thundercloud electrification 2. Electrification of clouds.**—*I.L.D.*

10.8—280 551.574.11:551.578.11

Krustanov, L., **Ob aktivnosti ne vpolne smachivaemykh kondensatsonnykh iader.** [Activity of incompletely wetted condensation nuclei.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:16–21, **1957.** 2 figs., 5 refs., 14 eqs. **DWB, DLC**—The work of formation of droplets in the atmosphere in the presence of condensation nuclei is a criterion of the activity of these droplets and can be determined thermodynamically. On the assumption that the condensation nucleus is a solid particle insoluble in water and fully wetted by it, it can attach water molecules to its surface and form a thin layer of water until the saturation of water vapor necessary for condensation begins. The growth of the elementary droplet into the regular drop is determined by the behavior of the thin water layer. For an isothermically reverse process the work necessary for the formation of a droplet around an externally, fully wetted water particle is $A_k = \frac{4}{3}\pi r_k^2\sigma - \frac{4}{3}\pi r_0^2\sigma\left(3 - 2\frac{r_0}{r_k}\right)$. A_k will be always less than $A^0_k = \frac{4}{3}\pi r_0^2$ necessary for the formation of an equally large droplet in homogeneous water vapor. Equations are developed for determining the work needed to form a droplet in the case of a non-fully wetted nucleus for various angles of wetting $0 < \varphi < 90°$. *Subject Headings:* **1. Condensation nuclei 2. Drop formation.**—*I.L.D.*

10.8—281 551.574.11:(418.3)551.464

†*Metnieks, Arvids Leons, **The size spectrum of large and giant sea-salt nuclei under maritime conditions.** *Dublin Institute for Advanced Studies. School of Cosmic Physics, Geophysical Bulletin*, No. 15, July **1958.** 50 p. 7 figs., 14 tables, 63 refs. **DWB** (M(055) D814-gb)—The sea-salt nuclei in the atmosphere are of great interest today. Although they are not the only nuclei responsible for condensation in the atmosphere, they are regarded as the main agent for the initiation of rain from nonprecipitating clouds. The concentration and the size distribution of sea-salt nuclei in the air are measured for the first time in Ireland, namely: in Dublin, on the west coast of Ireland, and on the open sea west of Ireland, thus under typical maritime conditions and at or in the vicinity of their production. A description of the method of sampling, of the identification of chloride particles, of the evaluation of the samples and the results are given. For measuring the concentration and the size of the sea-salt particles VITTORI's gelatine technique has been modified and adapted for use under difficult field conditions. The measurements of nuclei size range from about dry particle radius 0.1μ to the largest encountered. The concentrations and size distribution of the sea-salt nuclei found in Ireland generally do not show any anomalies; the numerical values correspond to those obtained by others under similar conditions. Occasionally, however, even under maritime conditions when the production rate of the sea-salt nuclei is small, the concentration can be quite low. The size distribution of the sea-salt nuclei within the range of approximately 0.2μ to 10μ, although being only a component of atmospheric pollution, also obeys JUNGE's size distribution law for aerosol particles $N = C'r^{-b}$. The index b, at least for sea-salt nuclei is not constant but in turn depends on the particle concentration N. No correlation exists between the concentration of condensation nuclei and that of the sea-salt particles in polluted air in Dublin. A

qualitative life-history of the sea-salt component in the atmosphere is given describing its production, vertical and horizontal transportation and removing agents from the troposphere. *Subject Headings:* **1. Sea salt nuclei distribution 2. Saline nuclei concentration measurement 3. Dublin, Ireland.**—*Author's abstract.*

10.8—282 551.574.12:551.578.11

Hocking, L. M. (*Univ. College, London*), **The collision efficiency of small drops.** *Royal Meteorological Society, Quarterly Journal*, 85(363):44–50, Jan. **1959.** 3 figs., 7 refs., 5 eqs. **DWB, DLC**—The forces on two moving spheres are found from the Stokes equations of motion, full allowance being made for the mutual interference of the flows round the spheres, and the relative trajectories when they are falling under gravity are calculated so that the collision efficiency E can be found. The values of E are determined for drops of radius up to 30μ colliding with droplets of any smaller size. The results differ widely from those found by Pearcey and Hill (1957 *see* 8.3–268, March 1957, *MAB*) and it is suggested that the reason for the discrepancy is that the motion of the spheres when they are close together is of great importance in determining E. The results also differ from those found by Schotland and Kaplin (1956, *see* 8.6–279, June 1957, *MAB*). Their experiments did not model the ratio of the density of the spheres to that of the medium through which they are falling and, since it is shown that this factor is of importance, their results are not considered applicable to water drops falling in air. *Subject Headings:* **1. Collision of spheres 2. Droplet collision efficiency.**—*Author's abstract.*

10.8—283 551.574.12:551.578.11

Levin, L. M., **O koaguliatsii zariazhennykh oblachnykh kapel'.** [Coalescence of charged cloud drops.] *Akademiia Nauk SSSR, Doklady*, 94(3):467–470, **1954.** 2 tables, 7 refs., 12 eqs. **DLC** (AS262.S3663). English transl. available from Associated Technical Services, P.O. Box 271, East Orange, N. J., as its ATS-31K20R. Also his: **O funktsii raspredeleniia oblachnykh i dozhdevykh kapel' po razmeram.** [Distribution function of cloud and rain drops by sizes.] *Ibid.*, 94(6):1045–1048, **1954.** 3 figs., 11 refs., 4 eqs. **DLC** (AS262.S3663). English transl. available from Associated Technical Services, as its ATS-70K20R—According to current theory, cloud droplets with diameters between 4 and 30μ grow only by means of water-vapor condensation. In the first article, this hypothesis is subjected to a theoretical analysis which leads to the conclusion that droplet growth in this size range can also occur by means of coalescence of electrically charged drops. In the second article, extensive measurements of drop size distribution in clouds made during the 1952–1953 Mount Elbrus Expedition under a wide variety of conditions (average results are presented in graphs) confirm earlier assumptions that cloud droplets are distributed according to a normal logarithmic function. A similar distribution was found for raindrop sizes from a limited amount of measurements. The fact that droplets of sizes between 4 and 50μ are distributed logarithmically indicates that coalescence occurs over the entire range of these sizes, thus confirming the author's earlier hypothesis that electrically charged droplets may grow by coalescence in the size range between 4 and 30μ. *Subject Headings:* **1. Coalescence of cloud drops 2. Electrical effects on drop coalescence 3. Drop size distribution in clouds 4. Raindrop size distribution.**—*G.T.*

10.8—284 551.574.12:551.576.1:535.34

Penndorf, Rudolf (*Electronics Res. Lab., A VCO Manufacturing Corp., Boston*), [**Comments on**] **Ralph G. Eldridge: Measurements of cloud drop-size distributions** [**and**] **Reply by Eldridge.** *Journal of Meteorology*, Boston, 14(6):573–577, Dec. **1957.** 2 tables, 6 refs. **DWB**—A lengthy discussion of several points which Penndorf raises about the validity of conclusions in Eldridge's paper (*see* item 8.6–276, June 1957, *MAB*) on the measurement of drop size distributions from spectral transmittance of light ($2.2–8.0\mu$). Penndorf asserts that a given transmittance value does not provide a unique cloud drop size distribution. Other discrepancies which Penndorf says cast doubt on the validity of the conclusions, are not relevant, according to Eldridge. *Subject Headings:* **1. Cloud drop size distribution 2. Spectral transmittance measurements of drop distribution. I. Eldridge, Ralph G.**—*M.R.*

FOG

See also: **Wind eff. on flying weather, Oslo Fjord** (Dokken), 10.8–112; **Fog composition, Cardington, Wales** (Stewart), 10.8–127.

10.8—285 551.575.1(433):551.577:551.588.2

Baumgartner, Albert (*München*), **Zur Höhenabhängigkeit von Regen- und Nebelniederschlag am grossen Falkenstein (Bayer. Wald).** [Vertical distribution of rain and fog precipitation at the Grosser Falkenstein (Bavarian Woods).] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957,* [*Transactions*], Vol. 1:529–534, pub. **1958.** 4 tables, 8 refs. **DWB**—Between altitudes of 612 and 1312 m, a stretch was established 6 km long from the valley over the mountain to the opposite valley, with rain gages and Grunow fog gages at 23 places. The function of height, the hydrological meaning of the fog-precipitation and the relationship to the mountain forest are discussed. *Subject Headings:* **1. Fog precipitation 2. Vertical precipitation variations 3. Bavaria, Germany.**—*Author's abstract.*

108.—286 551.575.1(436.1)

Drimmel, Julius (*Zentralanstalt für Meteorologie und Geodynamik, Wien*), **Theorie und Vorhersage der Hochnebelbildung im Wiener Becken.** [Theory and forecasting of high-level fog in the Viennese Basin.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A,* 10(4):410–414, **1958.** 19 refs. German, English and French summaries p. 410. **DWB, DLC**—A radiation-turbulence model for the formation of high fog in the Vienna basin is described showing that stratus outside bad weather regions can be expected only on the margin of high-pressure areas with southeastern surface wind. This as well as other conclusions which can be used for forecasts are in perfect agreement with experience. *Subject Headings:* **1. Fog formation 2. High altitude fog 3. Vienna Basin, Austria.**—*Author's summary.*

10.8—287 551.575.1:543

Matsumura, Nobuo, **On the ratio of Cl-Mg in fog water (Preliminary report).** *Low Temperature Sciences, Ser. A, Physical Sciences,* Sapporo, Japan, 14:125–133, **1955.** 3 figs., 3 tables, 14 refs. In Japanese; English summary p. 133. **DWB, DLC**—At the time of the observations on fog-preventing forest along the shore of Akkeshi in Hokkaido in the summer of 1953, samples of water which had been collected by the capturing part of a self-recording fog-meter were used for the chemical analysis of Cl and Mg. The samples may be considered as the mixture of fog water, rain and sea salts. Values of Cl/Mg were sometimes larger or smaller than that of sea water. In the present discussion, taking into consideration the facts that the ratio in rain is smaller than that of sea water and that it varies with meteorological conditions, the writer believes that the causes of the variation of Cl/Mg ratio are as follows: 1) The ratio in fog water is the same as that of sea water, while the ratio in sea salts is different from that of sea water. 2) The ratio in sea salts is identical with that of sea water, but the ratio in fog water differs from that of sea water. 3) The ratios in fog water and sea salts vary concomitantly with that of sea water. 4) The ratios in fog water and sea salts accidentally vary in comparison with that of sea water. In order to ascertain the above assumptions more detailed observation and experiments are required. *Subject Headings:* **1. Fog water composition 2. Sea fog composition.**—*Author's abstract.*

10.8—288 551.575.1(711,266)

Pincock, G. L. and Turner, J. A. (*both, Canadian Met. Serv.*), **Advection fog along the British Columbia coast and over the North Pacific Ocean during late summer and early autumn.** *Pacific Science Congress, 8th, Quezon City, Philippines, Nov. 1953, Proceedings,* Vol. IIA, pub. **1956.** p. 955–962. 2 figs. **DWB**—"The principles underlying the formation of advection fog over British Columbia's coastal waters are outlined briefly. A semiquantitative method for determining the distribution of fog in a persistent pressure field is given." This method involves the use of a graph or table giving saturation mixing ratio in terms of temperature and charts giving mean sea surface isotherm for the various months. The results obtained by this procedure are compared with actual historical weather maps for August of various years con-

sidered, and it was found that the observed fog was somewhat less than expected. Finally, the observed distribution of fog along the west coast of Vancouver Island is discussed. *Subject Headings:* **1. Advection fog 2. British Columbia 3. North Pacific Ocean.**—*I.L.D.*

10.8—289 551.575.1:551.578.4(98)

Robinson, Elmer; Thuman, William C. and Wiggins, Ernest J., **Ice fog as a problem of air pollution in the Arctic.** *Arctic*, Ottawa, 10(2):89–104, **1957.** 9 figs., 12 refs. **DLC**—The authors describe the general characteristics of ice fogs with special reference to the ice fogs observed in the Alaskan and Canadian interior. This is followed by a detailed account of the physical-chemical properties of ice fog, namely: the fog aerosol, the distribution of ice particle sizes, the nature of droxtals, etc., the sources of ice fog, such as the role of combustion and the meteorological conditions in ice fog formation. *Subject Headings:* **1. Ice fog 2. Fog particles 3. Arctic.**—*I.L.D.*

10.8—290 551.575.36:551.576.36(548)

*Chandiramani, W. G. (*Regional Met. Center, Nagpur*), **Incidence of fog and low stratus clouds over Begumpet airport during winter months.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):345–348, Oct. **1958.** 3 figs., 5 tables, 6 refs. **DWB, DLC**—The incidence of fog and low stratus clouds at some of the aerodromes has been discussed by various workers (Sreenivasaiah, 1944; Elsworth, 1945; George, 1948; Chakravortty, 1948; Rangarajan, 1952 and Basu, 1952). A similar study of occurrence of fog at Begumpet airfield has been undertaken by the author. *Subject Headings:* **1. Fog frequency studies 2. Airport visibility 3. Begumpet airport, India.**

CLOUDS

See also: **Radar obs. of clouds and thunderstorm activity** (Kolokolov), 10.8–133; **Convective clouds** (Chuvaev), 10.8–172; **Cloud eff. on radioactivity** (Garbaliauskas), 10.8–201; **Precip.-vertical motion rel.** (Sanders), 10.8–206; **Radiation res. and wide angle sky photog.** (Dirmhirn), 10.8–227; **Low cloud eff. on turb.** (Abramovich), 10.8–259; **Cloud drop size distrib.** (Penndorf), 10.8–284; **Airport visibility, Begumpet Airport, India** (Chandiramani), 10.8–290; **Cloud eff. on elec. conductivity** (Krasnogorskaia), 10.8–354; **Cloud charge distrib.** (Fitzgerald), 10.8–355.

10.8—291 551.576.1:551.521.11(438)

*Parczewski, Władysław, **O współzależności między rodzajami chmur a przebiegiem usłonecznienia.** [Correlation between types of clouds and insolation.] *Przegląd Geofizyczny*, Warsaw, 2(4):209–232, **1957.** 6 figs., 25 tables, 5 refs. French and Russian summaries p. 218–219. **DWB, DLC**—The results of a study of the correlation between the annual variation of mean diurnal insolation values and the frequency of Cu and Cb clouds, as well as St and Sc opaque clouds, based on records for Wrocław, Rabka and some other localities in the Polish plains are presented and discussed. It has been found that (1) the maximum diurnal insolation occurs the earliest when the mean diurnal values are the greatest; (2) the maximum diurnal insolation is displaced toward the morning hours in proportion to the decrease of the frequency of St and Sc opaque clouds, (3) the frequency increase of Cu and Cb clouds; (4) mean diurnal insolation values increase with the increase of recurrence of Cu and Cb clouds, and decrease when there is a greater frequency of St and Sc opaque clouds. Numerous tables and graphs illustrate the analysis. *Subject Headings:* **1. Cloud type-insolation relationships 2. Insolation variations with cloud type 3. Poland.**—*A.M.P.*

10.8—292 551.576.1:629.135.2

Belgium. Force Aérienne. Service Météorologique, **Les traînées blanches d'avions.** [The white trails of airplanes.] Its *Manual* No. 26, April **1957.** 16 p. 6 figs.—After a general introduction this note takes up the classification of condensation trails. Distinction is made between exhaust trails, convection trails and aerodynamic trails. The formation, characteristics, tactical importance, suppression and forecasting of each of these types of trails are described. A chapter deals with exhaust trails in detail. *Subject Heading:* **1. Contrails.**—*A.V.*

10.8—293 551.576.11:778.38

Morasca, Nicola, **La topografia delle nubi.** [Topography of clouds.] *Rivista di Meteorologia Aeronautica*, Rome, 18(4):20–25, Oct./Dec. **1958.** 5 figs., eqs. Italian, French, English and German summaries p. 20. **DWB**—The determination of position, size and height at bottom and top of clouds, especially of cumulonimbus, is of a notable interest both for aviation forecast and for the physical study of cloud formation. Since direct observation from the ground or from an aircraft is known to prove largely misleading, it was thought proper to study and develop a simplified photogrammetric method, permitting attainment of reasonable accuracy in determining the above-mentioned values, and the shifting velocity of the cloud formations as well. This method proves quite sound, and can be used for particular studies; it also affords a useful way to acquire experience in direct optical estimates. *Subject Headings:* **1. Cloud structure 2. Cloud photogrammetry.**—*Author's abstract.*

10.8—294 551.576.11:551.524.4

Parczewski, Władysław, **O niektórych wyglądach chmur przy występowaniu w troposferze termicznych warstw hamujących.** [Certain aspects of clouds during their appearance in the temperature inversion layers of the troposphere.] *Przegląd Geofizyczny*, Warsaw, 2(3):115–120, **1957.** 3 figs., 3 refs. French and Russian summaries p. 119–120. **DWB, DLC**—The author analyzes the external aspect of cumulus clouds in cases where they reach the temperature-inversion layer, and discusses the thermodynamic conditions which, according to him, are the cause of the appearance of different forms of clouds with vertical development in the presence of retaining thermal layers. *Subject Headings:* **1. Inversion effects on clouds 2. Cumulus cloud formation.**—*A.M.P.*

10.8—295 551.576.11:551.524.7:551.571.7

Roulleau, Maud, **Sur la persistance des traînées de condensation.** [Persistence of condensation trails.] *Journal Scientifique de la Météorologie*, Paris, 10(38):87–89, April–June **1958.** 2 tables, 3 refs. **DWB**—Study of the persistence of contrails (which does not depend on the temperature but on the humidity conditions in which they appear). The trails may only be persistent if the atmospheric water vapor pressure is higher than the saturation vapor pressure with respect to ice. At temperatures permitting the formation of trails, these will only be persistent if the humidity exceeds a certain value (50% at −70°, 55% at −60°, 61% at −50°, 68% at −40°). Taking into account the relatively narrow correlation between the temperature of the tropopause and the humidity of the air, one can demonstrate statistically that the lower the temperature of the tropopause, the higher the number of persistent trails. The persistence of trails seems thus to be strictly bound to the nature of air masses and appears to be much greater in tropical air than in polar air. *Subject Headings:* **1. Contrails 2. Upper air humidity 3. Tropopause temperatures.**—*A.V.*

10.8—296 535.34:551.576.2

Piotrowski, Stefan (*Obserwatorium Astronomiczne U.W.*), **Z zagadnień świecenia zachmurzonego nieba dziennego.** [Problems of the brightness of the cloudy day sky.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):171–177, **1956.** table, 8 refs., 3 eqs. English summary p. 177. **DWB, DLC**—Present state of research on diffusion of light in a foggy atmosphere, and problems in the study of cloud optics are treated. An exact asymptotic formula is then presented for light transmission through a uniform layer of thick clouds. Finally, suggestions are made for a special observation program on the monochromatic flux of light diffusely transmitted through stratus clouds. *Subject Headings:* **1. Light transmission through clouds 2. Cloud optics.**—*From author's abstract.*

PRECIPITATION

See also: **Isohyetal charts, Brazil,** 10.8–16; **Radar precip. echoes** (Shupiatskiĭ), 10.8–136; **Radioactivity in precip.** (Becker), 10.8–199; **Radioactivity in precip.** (Garrigue), 10.8–202; **Precip.-vertical motion rel.** (Sanders), 10.8–206; **Temp. trends and statistical studies, India** (Howe), 10.8–245; **Evap.-rainfall correl.** (Drozdov), 10.8–276; **Fog precip., Bavaria** (Baumgartner), 10.8–285; **Floods, Calif., 1955** (Cole, Scanlon), 10.8–317.

10.8—297 551.577:551.579:631.6(492)

de Zeeuw, J. W. and Hellinga, F. (*Landbouwhogeschool, Afdeling Cultuurtechniek, Netherlands*), **Neerslag en afvoer.** [Precipitation and discharge.] *Landbouwkundig Tijdschrift,* Wageningen, 70(5):405–422, May **1958.** 5 figs., table, 11 refs., eqs. English summary p. 420. **DA**—One of the features in drainage planning is finding a value for the design discharge, the discharge on which is based the dimensions of drains, watercourses, culverts, pumping stations, etc. Some relation must exist between this design discharge and the design storm, i.e., the most unfavorable distribution of precipitation intensities to be taken into account. This relation is a very complicated one, as it depends on the topographic, hydrologic, pedologic and land-use properties of the drainage basin. Many investigators analyzed recession curves with the aid of negative exponential functions. The present authors found that in many cases this method does not need to be restricted to the falling parts of hydrographs, but that the variations in discharge intensities over long periods can be reconstructed by subdividing the period in time intervals of equal length. The proposed method means a simplification of the natural circumstances, so it cannot be expected that the reconstructed hydrograph fits every situation. Many investigations of drainage basins of different area and nature showed, however, that in general the peak discharges, which are the object of this paper, can be closely approximated if the right values of α (intensity factor—day^{-1}) are chosen. Three different ways are indicated for finding α: a) from hydrologic data, b) from a hydrograph with recorded rainfall, c) from two discharge intensities, a_0 and a_T, read from the falling part of a hydrograph. When the intensity factor of a drainage basin has been determined and a design storm has been chosen, it will be possible to calculate the design discharge. Since, in the Netherlands, design discharges are nowadays generally derived from a rather fixed system of empirical values, the described method may be expected to be helpful in the objectivation and differentiation of basic design data. *Subject Headings:* **1. Precipitation-discharge relationships 2. Drainage planning 3. Design discharge 4. Netherlands.**—*From authors' summary.*

10.8—298 551.577(521):551.575.5

Ibukiyama, Japan. Weather Station, **On the relation between the precipitation and the underground water level at the foot of Mt. Ibuki, Shiga Prefecture.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology,* 21(1):39–41, **1957.** 2 figs., table, 2 refs. In Japanese; English summary p. 41. **DLC**—Observation of water level in wells was made during the summer of 1956 in the compound of the Ibukiyama Weather Station at the foot of Mt. Ibuki. The results are as follows: (1) The relation between the amount of precipitation and the rise of water level seems to vary with season. (2) The level is not changed even by a considerable amount of rainfall (about 20 mm) after spell of drought. (3) The change of level is likely to appear when a rainfall of 20 mm per day continues more than 3 days. (4) The level is generally high in rainy seasons. (5) The water temperature becomes high when the level rises. *Subject Headings:* **1. Ground water-precipitation relationships 2. Water table variations 3. Mt. Ibuki, Japan.**—*Author's abstract.*

10.8—299 551.577:551.594.21(433)

Israel, H. and Tewes, G., **Niederschlags- und Ladungsbildung im Gewitter.** [Formation of precipitation and of charges in thunderstorms.] *Geofisica Pura e Applicata,* Rome, 37: 197–204, **1957.** 4 figs., 4 refs., eqs. German and English summaries p. 197. **DLC**—An attempt to determine the precipitation in a thundercloud by measuring the amount of electrical charge in the cloud was made in July 1956 in the Bavarian Forest. An electric field variograph indicated the number and intensity of discharges from the cloud. These are correlated graphically with actual rainfall and runoff, and qualifications made in the light of isochronal charts o

ıe movement of the storm over the catchment area (Talsperre am Höllenstein) for the two orms studied (July 2 and July 11, 1956). Conclusion is that the method gives good qualitave, but not good quantitative results. *Subject Headings:* **1. Thunderstorm electricity-prepitation relationships 2. Bavarian Forest, Germany.**—*M.R.*

10.8—300 551.577.11/37

Levert, C., **De morfologie van een regen.** [The morphology of rain.] *Hemel en Damping*, The Hague, 56(10):183–193, Oct. **1958.** 3 figs., 7 tables. **DWB, DLC**—Since the uviograms at De Bilt (Netherlands) are analyzed mechanically and the results are put on ınched cards, almost every question about precipitation can be answered. For the morphogical analysis of rain, at least three methods can be used; in this article the author starts from e length *d*, the mean intensity *i*, or the quantity *h* of a given period of rain. Each of these ethods is explained by an example. Within the principal rain, the situation, duration and ıantity of a heavy rain are determined for the Netherlands. Especially in summer, heavy in is very often situated near the start of the rain; the durations of the heavy rains are usually ss than half of the continuous rain period, but the quantities reach 60 to 70% of the principal ins. The situation of the heaviest fifteen minutes, M 15, and of the heaviest five minutes, 5 is examined. M 5 and M 15 fall much more in the first half of the principal rain, but for 15 this is not so striking; M 5 does not always belong to M 15. *Subject Headings:* **1. Morıology of rain 2. Heavy rain in short periods.**—*A.V.*

10.8—301 551.577.2:551.577.36

Huff, F. A. (*State Water Survey Div., Urbana, Ill.*), **Relation between point and areal rainll frequencies.** *American Meteorological Society, Bulletin*, 39(7):363, July **1958.** 3 refs. **WB, DLC**—The author's original note of same title (*AMS, Bull.*, May **1956;** *see* 8.9–261, pt. 1957, *MAB,*) was discussed by C. Levert (*AMS, Bull.*, Dec. 1957; *see* 10.1–293, Jan. 1959, *AB*) who was concerned primarily with Huff's use of the correlation coefficient for which clariation is given here. Conversion factors for transforming point frequencies to aerial frequencies e presently being developed by the U. S. Weather Bureau. *Subject Heading:* **1. Point-areal infall frequencies.**—*W.N.*

10.8—302 551.577.2(213)

Ivanov, N. N., **Nekotorye osobennosti raspredeleniia atmosfernykh osadkov v tropichkikh i sopredel'nykh s nimi stranakh zemnogo shara.** [Characteristics of precipitation disbution in tropical and contiguous regions.] (In: Vsesoiuznoe Geograficheskoe Obshchestvo SSR, **Voprosy Geografii.** Moscow, **1956.** p. 134–137. 7 refs.) **DWB, DLC** (G58.G35)—ı the basis of B. P. Alisov's **Climatic regions of foreign countries** (*see* 2.10–155, Oct. 1951, *AB*), the author presents a review of certain peculiarities of precipitation distribution in ɔpical and contiguous countries. An analysis of material pertaining to 1800 places shows that second amplitude of precipitation is peculiar, in an almost equal degree, to equatorial and ɪra-equatorial regions. *Subject Headings:* **1. Areal precipitation distribution 2. Tropical nfall distribution 3. Tropics.**—*A.M.P.*

10.8—303 551.577.2(52)

Magono, Choji and Orikasa, Keitaro, **The character of precipitation in the Lake Shikaritsu Basin.** *Sapporo, Japan. Hokkaido Univ., Geophysical Bulletin*, 5:67–77, Oct. **1957.** 7 s., 5 tables. In Japanese; English summary p. 77. **DWB**—The distribution of each rainl was measured by seven integrating self-recording rain gages in the Lake Shikaribetsu Basin, ɔkkaido through 1955 and 1957. The altitude of the basin is much higher than that of other ɛas around the basin. The distribution was classified into four types: 1) south-east type—a ıvy rainfall zone was found in the mountain area to the south-eastern side of the basin; 2) ·th type—the rainfall in the northern part was more intensive than that of southern part; 3) iform type—the rainfall was uniform over whole basin; 4) nongeostrophic type—the rainfall he basin was smaller than that of the other adjacent areas. In almost all rainfalls, the rain- intensity in the basin was larger than that of the other adjacent areas owing to the geoɔphic effect. Most of the rainfalls belonged to the first type. It was noted that the princi- direction of prevailing wind during the rainfall in southeastern type was from the southeast.

Considering the result, it is believed that the southeastern type of rainfall distribution was resultant from "spill over" effect of wet air mass from Pacific Ocean, and north type similarly caused by northern wind. The assumption was supported by the relation existing between snowfall distribution and northern wind direction in the winter seasons. *Subject Headings:* **1. Precipitation distribution 2. Rainfall types 3. Lake Shikaribetsu Basin, Hokkaido.**—*Authors' abstract.*

10.8—304 551.577.21(41/2):551.577.3

Reynolds, G., [**Discussion of**] **S. Gregory: Annual rainfall probability maps of the British Isles** [**and**] **Reply by S. Gregory.** *Royal Meteorological Society, Quarterly Journal*, 84(360) 184–185, April **1958.** table. **DWB, DLC.**—REYNOLDS argues that the annual rainfall totals in the British Isles are skewed positively. He illustrates it by the following: During 1901–30 at Bidston only one year was below average by >5", while 3 yrs had > 5" excess, and for 1867–1956 the greatest annual rainfall was 17" above and the driest year 8.6" below average. GREGORY replies that skewness is not great enough to upset the frequencies to any great extent; that their calculation for 670 "derived" stations would be difficult, and if for a few stations, would be of limited use to water engineers; that 30 yrs is too short a time to consider for computing skewness as shown by comparing observed and computed 1901–30 data with 1881–1950 data for 5 stations and that skewness corrections, would, if applied to 1901–30 data which was a wet period, aggravate the bias away from the dry periods. (For abstract on original, *see* 9.2–233 Feb. 1958, *MAB.*) *Subject Headings:* **1. Rainfall probability 2. British Isles.**—*M.R.*

RAIN, SNOW AND HAIL

See also: **Snow cover climates, Canada, Alaska** (Bilello), 10.8–51; **Spectral reflectivity** (Dirmhirn), 10.8–236; **Albedo of snow surface, Mt. Kavkasioni, U.S.S.R.** (Sulakvelidze), 10.8–237; **Drop formation** (Krustanov), 10.8–280; **Droplet collision eff.** (Hocking), 10.8–282; **Raindrop size distrib.** (Levin), 10.8–283; **Fog particles, Arctic** (Robinson et al.), 10.8–289.

10.8—305 551.482:551.578.4:551.579.

Il'in, I. A., **Istochniki pitaniia i usloviia stoka reki Ala-Archa.** [Sources of alimentation and discharge conditions of the Ala-Archa River.] *Tashkent. Geofizicheskaia Observatoriia Trudy*, No. 10(11):153–163, **1954.** 6 figs., table, 3 refs. **DLC**—The paper contains some information on the condition of the river's alimentation in the upper part of the basin and basic information on its glaciers, based on materials of the 1940 expedition sent by the Dept. of Hydrology of Tashkent Hydrometeorological Service Administration, which carried on the exploration of 9 glaciers. *Subject Headings:* **1. River alimentation from glaciers 2. Glacial runoff 3. Ala-Archa River, Tashkent.**—*A.M.P.*

10.8—306 551.578.46:551.588.6(47,5

†Rakhmanov, V. V., **Vliianie lesov na formirovanie snezhnykh zapasov.** [The influence of forests on the accumulation of snow reserves.] *Meteorologiia i Gidrologiia*, No. 11:21–2 Nov. **1956.** 3 figs., 2 tables, 24 refs. **DWB, DLC**—The conflicting opinions on the influence of forests upon snow accumulation are attributed to the fact that snow surveys were carried out not only in different forest stands (varying density, growth, etc.) but also under different meteorological conditions. In this article the influence of forests upon snow reserves is based upon data obtained at 84 hydrometeorological stations in European U.S.S.R. and in southern Siberia. Data are presented on the mean coefficient of snow reserves in the western, central and eastern regions of European U.S.S.R., the mean coefficient of annual snow reserves for the period 1945/46–1953/54, the variation of water reserves in snow cover in field and forest, mean daily temperatures and precipitation for several stations and dependence of snow reserves in forest and field upon the totals of positive air temperatures during the winter. The dependence of snow reserves upon winter temperature conditions is demonstrated. *Subject Headings:* **1. Forest influences on snow accumulation 2. Snow data 3. Snow retention 4. Europe U.S.S.R.**—*I.L.D.*

10.8—307 551.578.7:629.13(68)

Aircraft damaged by hail. *South Africa. Weather Bureau, News Letter*, No. 103:6, Oct. , 1957. **DWB**—Jagged hailstones, the size of tennis balls (one as big as a cricket ball), were countered in a flight from Johannesburg to Cape Town on Sept. 26, 1957 at 8000 ft. The trodome was smashed, the wind screen shattered, and dents as big as a man's fist made in the se and engine cowlings. The hail occurred in a front which paralleled another one almost 50 wide, updrafts of 2000 ft/min were encountered in the severe turbulence area of the second ont. Severe hail lasted 3 or 4 min. Outside air temperature was +10°C. *Subject Headings:* **Hail damage to aircraft 2. Johannesburg, South Africa.**—*M.R.*

10.8—308 551.578.7(712.3)

*Douglas, Richard H. and Hitschfeld, Walter, **Studies of Alberta hailstorms, 1957.** McGill niv. Macdonald Physics Lab. Stormy Weather Research Group, Contract AF 19(604)-2065, ientific Report MW-27, May **1958.** 79 p. figs., tables, 5 refs. **DWB** (M94.2 M145s)—A ecial network of 3600 reporting stations was set up in Southern Alberta during the summer of 56 and was continued during June–Sept. 1957, to make studies of hailstorms. The surface orts were supplemented by 3.2 cm radar observations at Penhold (the area extended from lmonton to Calgary with center at Penhold). Upper air data were obtained at all 3 stations. ata were analyzed at McGill Univ. by the Stormy Weather Group. In 1956, 46 days out of had hail somewhere in the area, compared with average of 3.5 days a year for Alberts for ual records. The detailed analysis of each of 5 major storm days (some with as many as 10 parate storms) are presented with graphs, tables and charts, radar scope diagrams, etc. nally, the correlations, summary of data on height of echo tops, seasonal trends, upper air mperatures and recommendations are presented. Time lapse cloud photos were also made d studied. Some are reproduced. Hail size data were obtained and analyzed to some extent. was estimated that about 20% of the farmers reported heavy hail and about 5% when the il was light. Several "deep freeze" hail collectors (electrical or nonelectrical) are suggested preservation of samples of hail in regions of frequent hailstorms. They would cost $200 to 00 each and would be partially filled with kerosene to prevent hail sticking together. A rked correlation was found between hail probability and height of cloud or storm echo, and th temperature of top below −30°C (correlation is reversed above −30°C). Nonhail clouds ow a marked lower height of top of cloud than do hailstorm clouds. Relation to tropopause lso shown graphically, in many cases the top penetrated the tropopause (30–40 thousand ft). rgest hail occurs late in July (and also highest tops). Comparison is made with similar data m Denver and New England areas. On July 21 and Aug. 19–20 the storms were 20–25 mi diameter. Some lasted 3 hrs or more. Evidence was found that sudden up-surges of echo s were followed by hail, indicating an updraft of 8 M/sec as a critical speed for hail formation. *bject Headings:* **1. Hail frequency studies. 2. Hailstorms. 3. Alberta, Canada.**—*M.R.*

10.8—309 551.578.7

Sashō, Yoshio (*Met. Res. Inst., Tokyo*), **Some studies of the ice pellet.** *Papers in Meteoro- y and Geophysics*, Tokyo, 8(4):271–281, Jan. **1958.** . 16 figs., 2 tables, 6 refs., 6 eqs. **DWB**— me glass-like ice-drops, considered to be frozen rain drops or cloud particles (in this paper, ese drops will be known as ice pellet) have been found in falling snowflakes during observation radiation from the snow surface at Maruike, Shiga Plateau, on Feb. 25, 1957. The author de some observations on the shape, size distribution, and collision coefficient of the ice lets from their plastic replicas, and found that Marshall-Palmer's equation holds well for the e-distribution of the ice pellet, and that combination among the similar sized ice pellets curs more frequently than expected. *Subject Heading:* **1. Ice pellets.**—*Author's abstract.*

10.8—310 551.578.71

·Litvinov, I. V., **O proiskhozhdenii mnogosloĭnykh gradin.** [Origin of stratified hail nes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:277–279, Feb. **1958.** 2 figs., refs. **DLC**—Transl. into English by John Miller, issued by American Meteorological So- ty under Contract AF 19(604)-1936. Oct. **1958.** 7 p. Several proposed explanations the formation of stratified hail stones, in particular those in which transparent and aque layers alternate, are discussed. The analogy to the formation of hoarfrost and

rime, the hypothesis of the oscillating movement of hail during growth, the work of SHISHKIN on the formation of hail, etc. are discussed. In the presence of considerable water, a transparent layer can form on hail at negative air temperatures and in the absence of drizzle-sized droplets in clouds. The central opaque nucleus is explained by the fact that the presence of large clouds with considerable water content necessary for a transparent layer is infrequent. The formation of hail stones in the shape of "nuts" and "small plates" may occur during the fall of hail through clouds with considerable water content. The presence of stratification can be explained by the fact that, during motion downward, the hail particle intersects cloud areas with large or small water content. During passage through clouds with large water content, the surface temperature of the hail stone rises and a transparent layer is formed and vice versa. *Subject Headings:* **1. Hail structure 2. Hailstones.**—*I.L.D.*

10.8—311 551.578.71(47)

Zamorskiĭ, A. D., **Vypadenie krupnogo grada.** [Large hail.] *Priroda*, Moscow, 47(3) 76–79, March **1958.** 4 figs. **DLC**—A number of reports on hail sent into the editor of *Priroda* are presented. On June 14, 1952, hail having the shape of icicles with numerous sharp protrusions on all sides and having a length 7–8 cm and a cross-section of 1–5 cm² fell in the valley of the Sherubai-Nura River in central Kazakhstan. Spherical hail did not fall. Often the hail was oval shaped with concentric structure. Icicle-shaped hail forms at negative temperatures close to 0°C within supercooled clouds. The sharp protrusions are formed by the freezing of water films in the form of needles at negative temperatures close to 0°C. On May 28, 1950 in the district of the Usman pine forest, hail shaped like bars and polyhedra 3 cm in cross-section and larger, and also hail shaped like eggs and weighing as much as 75 gm was observed. The possible explanation of the rectangular shape of hail, the damage to plants caused by the hail and the accompanying synoptic conditions are described. An example of the damage to a forest caused by hailstones 4 cm in diameter in the Egor'ev District on July 7, 1956, is described. Other instances of usually large hailstones are described. *Subject Headings:* **1. Hail structure 2. Hailstone size 3. U.S.S.R.**—*I.L.D.*

10.8—312 551.578.72:551.509.54(540)

Venkateswara Rao, D. and Mukherjee, A. K. (*both, Met. Office, Jodhpur*), **On forecasting hailstorms by the method of vectorial wind changes.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):313–322, Oct. **1958.** 6 figs., 2 tables, 19 refs. **DWB, DLC**—The conditions leading to the occurrence of a number of hailstorms over northwest India have been investigated. The method of assessment of convergence by using 24-hour vectorial wind changes was found in these situations to be superior to the conventional methods and of definite prognostic value. The border region between cyclonic and anticyclonic wind shear patterns was found suitable for thunderstorm development whenever the cyclonic shear appeared in a moist air stream, notwithstanding the unfavorableness of the winds and of the thermal structure aloft. Strong upper winds and a pronounced vertical shear are found to promote transformation of the thunderstorms so formed into hailstorms. The direction of the associated squall, if any, lies close to that of the isallobaric wind. The variety of shapes and sizes of hailstones in the same or in different storms is attributable to the simultaneous occurrence of elementary hailstones, characterized by concentric shells, together with larger stones formed by the compounding together of two or more elementary stones. Compound hailstones possess a single common, glazed-ice envelope and breed just above the freezing level. Their jaggedness results from non-uniform accretion of supercooled water. The maximum size attained by hailstones is related to the severity of turbulence in a storm only if the specimen examined is of the elementary variety. *Subject Headings:* **1. Hailstorm forecasting 2. Synoptic conditions for hailstorms 3. Hailstone structure 4. India.**—*Authors' abstract.*

HYDROMETEOROLOGY

See also: **Engineering hydrology** (Linsley et al.), 10.8–9; **Limnological surveys, Lake Huron** (Ayers et al.), 10.8–23; **Water balance and PE charts** (Thornthwaite et al.), 10.8–35; **Russian-English hydrol. glossaries** (Sweet, *comp.*), 10.8–79; **Coffee res. and irrigation, Kenya** (Jones, Wallis), 10.8–121; **Radioactive rain and ocean water, N. Atlantic** (Giletti et al.), 10.8–203; **Glacial runoff, Ala-Archa River, Tashkent** (Il'in), 10.8–305.

10.8—313 551.579:551.465

Stoianov, G., **Opredeliane na popravochnite ili prevodnite koefitsienti pri izmervane na dnite kolichestva s pluvtsi.** [Determination of the correction or conversion coefficients ring measurement of water volume with floats.] *Khidrologiia i Meteorologii*, Sofia, No. 4: –23, **1956.** 4 figs., table, 2 refs., eqs. Russian and English summaries p. 23. **DLC**—Equa- ns are developed for expressing runoff amounts in terms of surface velocities (measured with ats or current meters). A test of the formulas against observational data appears to indicate at runoff amounts can be calculated from maximum surface velocities with sufficient accuracy. *bject Headings:* **1. Runoff calculations 2. Surface velocity of currents 3. Floats.**—*G.T.*

10.8—314 551.579:355

*Walke, C. L. R., **River characteristics and flow analyses for military purposes.** *U. S. rps of Engineers, Military Hydrology Bulletin*, No. 2, June **1957.** 15 p. numerous figs. and arts (some fold.) and tables. "Prepared in connection with RAND Project 8-97-10-003 by ilitary Hydrology Research and Development Branch, U. S. Army Engineer District, Wash- gton, Corps of Engineers." **DWB** (M79 U581mi)—Modern military strategy and tactics in a ven theater of war must take into account the physical and hydraulic characteristics of reams in the theater of operations, their flood potentials, and the uses and effects of hydraulic ructures operated not only for the purposes for which they were built but also as weapons of rfare. Much of the data needed to evaluate the hydraulic and hydrologic characteristics of reams and their bearing on military operations will be found available from open sources, ch as streamflow measurements, meteorological observations, channel surveys, and design ta on dams and reservoirs. This bulletin lists in fairly complete detail the types and amounts such data which will be required for a comprehensive, but not exhaustive, analysis of a river stem. It then describes the forms into which the basic data should be synthesized to be of eatest utility. Thus the bulletin will serve as a guide in the preparation of basic hydrologic alyses for a given river basin which, in turn, will provide a basis for the solution of specific draulic problems of military significance. *Subject Headings:* **1. River hydrology 2. Mili- y hydrology.**—*Author's abstract.*

10.8—315 551.579.2:551.579.4

Alekseev, G. A., **O zakonomernostiakh formirovaniia vnutrisutochnogo khoda vesennego ka na malykh vodotokakh.** [Laws governing the diurnal cycle of spring runoff in small eams.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:39–43, June **1958.** fig., 3 refs., 26 s. **DWB, DLC**—Beginning with the "genetic" formula for computing the discharge of ter Qt into a closed reservoir at any moment, t, the author derives an equation for computing diurnal variation of spring runoff $q(t)$ for a given daily water outflow or inflow into a channel $p(t)$, namely:

$$q(t) = \frac{h_\tau p_t + p_{t-1} + \cdots p_{t-\tau}}{\tau} = \frac{1}{\tau}\int_{t-\tau}^{t} p(t')dt'.$$

is formula shows that the diurnal variation of spring runoff $q(t)$ is formed by means of a mov- average of the diurnal variation of inflow into a channel net $p(t)$ for a period of water flow $= \frac{L}{V}$ along the length of the principle water stream. When $\frac{dq}{dt} = 0$ the maximum and mini- m modules of runoff q_{max} and q_{min} occur at the moment t_{max} and t_{min}, respectively, when

$q_m = q_{max}$ is characterized by the formula

$$qm = \frac{h_{\tau max}}{\tau_{max}} = \frac{1}{\tau_{max}} \int_{\tau max - \tau max} p(t)dt.$$

The theoretical analysis of the process of formation of diurnal spring runoff indicates that the recommendations of D. L. Sokolovskiĭ (*see* 10.7–270, July 1959, *MAB*) for computing maximum daily spring water discharges and the construction of a hydrograph of spring runoff in small streams, are unsuitable. *Subject Headings:* **1. Snow melt runoff 2. River hydrology.** —*I.L.D.*

10.8—316 551.579.4:551.45

Chebotarev, A. I. and Protas'ev, M. S., **Vremennyĭ poverkhnostnyĭ stok v pustynnykh raĭonakh Turkmenii.** [Temporary surface runoff in the arid regions of Turkmenia.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:40–43, **1957** table, 2 eqs. **DLC, DWB**—As a result of experimental studies on the runoff in desert areas and the factors determining it, it was found that the surface runoff in deserts is determined primarily by the rain regime, by the water physics of the soil and slope of the locality, and that the most favorable conditions for runoff in sloping valleys are complex, heavy clayey soil with a surface thickened crust, etc. In order to calculate flood runoff in desert regions, two methods are presented: they are based upon the dependence of runoff upon the layer of rainfall during the rainy period; rainfall intensity, soil moisture preceding rainfall and magnitude of catchment area. The first method of N. M. Aliushinskiĭ is represented by the equation $\phi = f\left(\frac{H_0 \cdot i}{H}\right)$ where ϕ—runoff coefficient, H_0—initial loss of runoff, H—layer of precipitation during the time of rain, and i—mean rainfall intensity. The second method is represented by the formula for the layer of total losses u_n i.e. $\mu = H^n \alpha\gamma\sigma$ where H—layer of precipitation during the rainfall period, n—index of degree—equal to 1 for sandy clayey soil, 0.87 for clayey soil with a crusted surface; α—coefficient of decrease of total losses as dependent upon mean intensity of runoff producing rain; γ—coefficient of decrease of losses as a function of soil moisture, and σ—coefficient characterizing variation of total losses as a function of catchment area. The results of calculations of actual flood runoff and computed values are compared and found in good agreement. A table giving data on total runoff which may be accumulated in desert areas of Turkmenia from different catchment areas, sloping clayey valleys, etc. is presented. *Subject Headings:* **1. Surface runoff in deserts 2. Desert flow runoff 3. Turkmen S.S.R.**—*I.L.D.*

10.8—317 551.579.4:551.577.61(794)

§*Cole, Robert O. and Scanlon, John P. (*both, National Weather Analysis Center, U. S. W. B., Wash., D. C.*), **Flood-producing rains in northern and central California, December 16–26, 1955.** *Monthly Weather Review*, Wash., D. C., 83(12):336–347, Dec. **1955.** 10 figs., 2 tables, 12 refs. **DWB**—A complete analysis of synoptic, climatic and statistical aspects of the record California rainfalls and floods of Dec. 16–26, 1955. Damage was estimated at $150,000,000 and 66 deaths were recorded. Sea level and 500 mb synoptic and frontal position charts showing blocking action in the Pacific, vertical motion charts (800 mb), isohyetal charts, baric charts, etc. are presented in support of analysis. *Subject Headings:* **1. Floods, California (Dec. 1955) 2. Flood damage 3. California.**—*M.R.*

10.8—318 551.579.

Dalrymple, Tate (*Water Resources Div., U. S. Geological Survey*), **Flood frequency relations for gaged and ungaged streams.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 268–27[illegible] 6 figs., 3 tables, 7 refs. **DWB** (M(06) I611g)—This paper describes the method used by the U. S. Geological Survey to analyze gaging station data so as to provide a means for determining the magnitude and frequency of momentary peak discharges at any place on any stream in a region, whether a gaged or an ungaged point. A region may be of any size—as a river basin, a state—so long as it proves to be hydrologically homogeneous. The analysis provides two curves. The first expresses the flood frequency relationship and shows variation of peaked di[illegible]

harge, expressed as a ratio to the mean annual flood, with recurrence interval. The second elates the mean annual flood to drainage area, or to drainage area and other significant basin haracteristics. A frequency curve may be defined for any place in the region by use of these wo curves. The procedure is: (1) Measure the drainage area and other appropriate basin haracteristics from maps; (2) From the second curve, select the mean annual flood correspond- ng to the proper drainage area factors; (3) From the first curve, select ratios to mean annual ood for selected recurrence intervals, as 2, 10, 25, and 50 yrs; and (4) Multiply these ratios y the mean annual flood and plot to define the frequency curve. *Subject Headings:* **1. Flood requency curves 2. River discharge correlation.**—*Author's abstract.*

10.8—319 517.94:519.241.1:551.482:551.579.4

Dichev, Dicho, **Opredeliane veroiatnata stoĭnost na koefitsienta na lineĭnata korelatsiia ri otsŭstvie na khidrolozhki nabliudeniia vŭrkhu rechnite ottotsi.** [Determination of the robable confidence interval of the linear correlation coefficient in the absence of hydrological bservations on river runoff.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:17–22, **1957.** 3 figs., qs. **DLC** (Slavic)—Equations are developed for computing coefficients of correlation between ydrological values of adjoining river basins in the presence or absence of observational ma- erial. Numerical examples are included. *Subject Headings:* **1. Correlation coefficients 2. iver discharge correlations.**—*G.T.*

10.8—320 551.579.4:551.482

Dzhordzhio, Z. V., **Mezhen' na rekakh Sredneĭ Azii.** [Winter low water period in Central sian rivers.] *Tashkent. Geofizicheskaia Observatoriia, Trudy*, No. 10(11):112–128, **1954.** figs., 4 tables, 4 refs. **DLC**—In this paper the author establishes the basic characteristics of easonal low water periods, the mean and extreme dates of the beginning, end, and duration of ow water in three groups of Central Asian rivers, differing by the height (over sea level) of the ater collecting portions of their basins. He establishes also the character of brief runoff ariations in low water periods and their dependence on air temperature and precipitation in inter. The data deal with seasonal low waters of 18 rivers. *Subject Headings:* **1. Low water eriods 2. Runoff variations 3. River hydrology 4. Central Asia.**—*A.M.P.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATIC ZONES

See: **Lat. influences on the ocean** (Fleming), 10.8–84; **Solar radiation distrib.** (Burdecki), 10.8–231; **Climate, U.S.S.R.** (Alisov), 10.8–336.

CLIMATE OF PARTICULAR PLACES

See also: **Climatic handbooks, U.S.S.R.** (Lebedev), 10.8–25; **Climatic monographs, Far Eastern U.S.S.R.** (Zanina), 10.8–26; **Snow cover climates, Canada, Alaska** (Bilello), 10.8–51; **Climate, European Subaractic** (Grigor'ev), 10.8–53; **Bibliog. on climate, Mediterranean** (Wallace), 10.8–76; **Bibliog. on climate, Malta and Gibraltar** (Wallace), 10.8–77; **World weather summary, 1957** (Booth), 10.8–138; **Climate, Little America** (Harlin), **10.8–142; Climate, Japan, 10.8–143.**

10.8—321 551.582(787) 551.586:633

Becker, Clarence F.; Long, Joseph and Hosick, A. H., **Wyoming Climatology Progress eport, 1958.** *Wyoming. Agricultural Experiment Station, Laramie, Mimeograph Circular*, o. 94, March **1958.** 11 p. 5 figs., table. **DWB** (M82.1/787 W992)—Daily meteorological ata have been punched for 30 to 33 yrs (1915–48) for 15 stations in Wyoming on 173, 923 and 009 IBM cards since Feb. 1956. A map shows location of stations. Cards are to be dupli- ted for the U. S. W. B., and 6 more stations will be punched. Cards were all verified. A ble shows progress for each station. Procedures used in a study of probability of rain on y for various required field times are outlined. Probability of a dry day or days following a y day in different weeks May 31–Sept. 5 for Sheridan, Laramie and Torrington was tabulated

and shown graphically for two week periods for each station, and for the 3 stations, comparatively. Probability of rain in July is twice as high at Laramie as at Sheridan. *Subject Headings:* **1. Punched card programs in climatology 2. Hay drying probabilities 3. Rainfall probabilities. 4. Wyoming.**—*M.R.*

10.8—322 551.582(44)

Guerlesquin, M. and Corillion, R., **Le climat de l'Anjou.** [The climate of the Anjou region.] *Société Botanique de France, Paris, Bulletin.* 104:46–50, **1957.** 2 charts.—Climatological study of the Anjou region based on statistical data covering a period longer than 60 yrs. The authors consider the weather types and the wind regime, the temperature, the precipitation and condensation, and the aridity index. Two charts inserted in this article display, respectively, the distribution of the annual mean precipitations and the annual mean indexes of aridity in Anjou. *Subject Headings:* **1. Climatic studies 2. Anjou, France.**—*A.V.*

10.8—323 551.582.1(262)

Baum, Werner A.; Gleeson, Thomas A. and Landers, Holbrook, [**Study of atmospheric conditions in the Mediterranean Area.**] Florida. State Univ. Dept. of Meteorology, Contract AF 19(122)-466, Final Report, June 30, **1957.** 13 p. eqs. **DWB** (M82.1/262 F636s)—Report discusses synoptic, climatic and theoretical studies, and studies of divergence and vorticity in the troposphere, made at Florida State University on the Mediterranean area during the past 6 yrs, and reported in scientific Reports 1–11 under this contract. *Subject Headings:* **1. Synoptic studies 2. Climatic studies 3. Mediterranean.**—*M.R.*

10.8—324 551.582.1(45)(02)

Kish, George, **Life in Europe: Italy.** Grand Rapids, Michigan, Fideler Co., **1957.** 160 p. photos. **DWB** (914.5 K614it)—Ch. 2 of this highly pictorial elementary book on Italy deals with the climate of Italy—warming effect of Mediterranean and cooling effect of Alps and other mountains, on local climate, is stressed. Warm winters and cool summers, dry winds in southern Italy in summer and rainy winters in Po Valley, and the hot moist winds (Sirocco) from the Sahara are characteristic. An attractive isohyetal map of Italy is included in this discussion. *Subject Headings:* **1. Geography textbooks 2. Climate of Italy 3. Italy.**—*M.R.*

10.8—325 551.582.2(753)

Ahnert, Frank, **Washington, D. C.: Entwicklung und Gegenwartsbild der amerikanischen Hauptstadt.** [Washington, D. C.: evolution and present appearance of the U. S. capital.] *Erdkunde,* Bonn, 12(1):1–26, Feb. **1958.** 17 figs., table, 18 foot-refs. English summary p. 1–2. **DLC**—This comprehensive geographic study of Washington, D. C., contains a summary of the climate of the city. The climate is described with the aid of graphs giving the mean monthly temperatures and precipitation, the mean daily variation of temperature, deviation of the monthly precipitation from the mean during 1946, and mean monthly cloudiness and a thermoisopleth diagram. *Subject Headings:* **1. Climate of Washington, D. C. 2. Washington, D. C.**—*I.L.D.*

10.8—326 551.582.2(81):551.585:551.588.

*Bernardes, Lisia Maria Cavalcanti (*Natl. Geog. Council of Brazil*), **Tipos de clima do Estado do Rio de Janeiro.** [Types of climate of the State of Rio de Janeiro.] *Revista Brasileira de Geografia,* Rio de Janeiro, 14(1):57–80, Jan./March **1952.** map, tables, foot-refs, bibliog. (6 refs.). French, Spanish, English, German and Esperanto summaries p. 77–80. **DWB, DLC**—A descriptive regional climatological study of the Rio de Janeiro Province, based on climatic types (Köppen) shown on a folded map. The effect of relief and of altitude on the seasonal climate (rainfall and temperature) of the super humid littoral, the Serra do Mar and the plateau and interior valley region are considered. Data on individual locations are mentioned in the text, and tables of monthly mean temperature and precipitation for 28 stations are included. *Subject Headings:* **1. Climate of Rio de Janeiro (State), Brazil 2. Climatic types 3. Orographic effects on climate 4. Rio de Janeiro (State), Brazil.**—*M.R.*

10.8—327 551.582.2(782)

Davis, P. (*Geophysics Research Directorate*), **Climatology of the region [of the Great Plains Turbulence Field Program]**. (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** p. 384–387. 2 figs., 2 tables, 4 refs.) **DWB**—This brief description of the climatology of the area of the Great Plains Turbulence Field Program contains graphs showing the distribution of sea level geostrophic winds for Aug. 1 to Sept. 15, distribution of sea level geostrophic winds with skies equal to or less than 3/10 clouded for Aug. 1 to Sept. 15 for O'Neill, Neb., and tables with data on the characteristics of the sea level geostrophic flow as a function of three classes of sky conditions during periods of at least 24 consecutive hours of southerly flow beginning at 2100 or 2400 hrs local time, and frequency of recurrence of precipitation and fog in the area of northeastern Nebraska and southeastern Dakota surrounding O'Neill. *Subject Headings:* **1. Climate of O'Neill, Nebr. 2. Great Plains Turbulence Field Program 3. Wind distribution data of O'Neill, Nebr.**—*I.L.D.*

10.8—328 551.582.2(782)

*Davis, P. and Giorgio, P. (*both, Geophysics Research Directorate*), **Summary of climatological conditions in northeastern Nebraska during the late summer of 1953.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y., Pergamon Press, **1957.** p. 388–389. 3 tables.) **DWB**—Tables are presented giving the climatological data for Aug. 1953 for those U. S. W. B. cooperative observing stations immediately surrounding O'Neill, Neb.; daily maximum and minimum temperature and precipitation from Aug. 1 through Sept. 11, 1953 and daily totals of insolation (ly/day) on a horizontal surface for Aug. 5 through Sept. 8, 1953 at O'Neill. *Subject Headings:* **1. Climatology of O'Neill, Nebr. 2. O'Neill, Nebr.**—*I.L.D.*

10.8—329 551.582.2(711)

*†Harry, Kenneth F. and Wright, John B., **The climate of Vancouver.** *Canada. Meteorological Branch, CIR-2985*, TEC-258, Nov. 15, **1957.** 51 p. 6 figs., 21 tables. **DWB**—Report includes history of observations at Vancouver, British Columbia, topography and climate, month by month weather at Vancouver, details of precipitation, wind, gales, heating degree days, storms, heat and humidity, drought, frost, etc. Besides the numerous tables of means, extremes and frequencies for individual months for the year, there are a number of interesting graphs of long period variations in the important elements, seasonal variations and the isopletal variation from southwest to northeast part of city (from < 40" to > 100" of rain per year). A list of references to published sources of data is appended. *Subject Headings:* **1. Climate of Vancouver, B. C. 2. Vancouver, B. C.**—*M.R.*

CLIMATIC CHANGES

See also: **Paleoclimatology and submarine canyons** (Ma), 10.8–22; **Climatic change** (Shapley, *ed.*), 10.8–39; **Cold water year, 1955, Pacific** (Rodewald), 10.8–87; **Temp. changes, N.W. Europe** (Fay), 10.8–250; **Solar-terrestrial rel.** (Öpik), 10.8–346.

10.8—330 551.583

Böckler, W., **Die Aussichten der Klimaänderung.** [Prospects for a change in climate.] *Naturwissenschaftliche Rundschau*, Stuttgart, 10(12):463, Dec. **1957. DWB, DLC**—Recent observations made in Aug. 1956 in Davis Strait near Baffin Land showed an above normal ice drift, and at the same time snow bands in northern Labrador continued into the summer down to the sea surface. At Iceland the ice record has reached its lowest level since the Middle Ages. Climatic change thus appears at a critical stage. In some cases it has leveled off and in other cases there has been a reversal. The maximum temperatures are beginning to become lower (based upon a lecture of M. RODEWALD before the Thirty First Meeting of Geographers, July 31, 1957 in Würzburg). *Subject Heading:* **1. Climatic changes.**—*I.L.D.*

10.8—331 551.583.14(712)

Currie, Balfour Watson, (*Physics Dept. Saskatchewan Univ.*), **Climatic trends on the Canadian prairies. 1956** (?) 7 p. 5 figs. Mimeo. **DWB** (M21.1/71 C976c)—The general climatic conditions over the Northern Hemisphere (especially the Arctic and sub-Arctic) during the past century are reviewed with comments on changes since the Ice Age. Data for 1884–1952 for Winnipeg, Edmonton and Regina show relation of departures of temperature and precipitation to sunspot cycle, trend in heating degree days (Winnipeg) since 1884, and in Jan., April, July and Oct. mean temperature at Regina since 1893. Conclusion is that during the past 50 yrs there has been a tendency toward a return to the warmer sub-Arctic conditions prevailing prior to 600 years ago. *Subject Headings:* **1. Climatic trends in sub-Arctic 2. Climatic changes 3. Prairie Provinces, Canada.**—*M.R.*

10.8—332 551.583.3(213)

Butzer, K. W. (*Geographisches Inst. der Univ. Bonn*), **The recent climatic fluctuation in lower latitudes and the general circulation of the Pleistocene.** *Geografiska Annaler*, Stockholm, 39(2/3):105–113, **1957.** 3 figs., 20 refs. **DLC**—The author analyzes the character of the recent climatic fluctuation in the subtropics and tropics in order to determine its applicability to the pluvial and interpluvial epochs of the Quaternary. Emphasis is placed upon the circulation changes related to precipitation in lower latitudes, in particular, the Mediterranean climatic province and the trade wind deserts of the Old World. An analysis of barometric pressure changes (1881/1901–20 to 1921–1940) for Jan. and for July, and of the annual precipitation anomalies 1881–1910 to 1911–1940 reveals (1) an intensification and northward shift of the subtropical high pressure cells and an intensification of the trades, accompanied by an expansion of the Saharan-Arabian arid zone in both latitudinal directions, (2) "decreased cyclogenesis in the equatorial convergence zone due to fewer upper air cold fronts from higher latitudes (meridional exchange of the upper atmosphere decreased) with a shrinkage of the humid tropics in Africa north of the equator," and (3) a marked weakening of the lower westerlies in latitudes 30°–40°N with northward shifts of the jet stream and polar front. The arid Pleistocene climates in the Saharan-Arabian area on the basis of meteorological and geological evidence indicate that the major phase of sustained aridity with large scale aeolian deflation and deposition occurred in the long Mindel/Riss Interpluvial of early Middle Pleistocene. The Sahara experienced a greater expansion during the Riss-Würm Interpluvial and during the early post pluvial period. The circulation pattern of the last two interpluvials was related very closely to the circulation anomalies of the recent climatic fluctuation, in particular to an intensified zonal or high index type. The circulation pattern associated with the retreat of the continental glaciers was apparently also a zonal or high index type. The existence of long, very moist periods in the Sahara area in Pre-pleistocene times when no glaciation was present suggests that "another form of non-glacial circulation favoring greater precipitation in the trade wind belts may possibly exist." *Subject Headings:* **1. Climatic variations 2. Tropical climatology 3. Quaternary climates.**—*I.L.D.*

MICROCLIMATOLOGY

See also: **Evapotranspiration in Arctic, Pt. Barrow, Alaska** (Mather, Thornthwaite), 10.8–15; **Project Prairie Grass, O'Neill, Nebr.** (Barad, *ed.*), 10.8–19; **Irrigated fields and spring wheat, U.S.S.R.** (Belukhina), 10.8–117.

10.8—333 551.584.4:551.5

Baden, W. and Eggelsmann, R., **Über den Einfluss der Vegetation leistungsfähigen Hoch-moorgrünlandes auf den Wasserhaushalt.** [On the influence of the vegetation of highly productive peat lands on the water balance.] *International Union of Geodesy and Geophysics Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 2, pub. **1958.** 387–396. 7 figs., 11 refs. French summary p. 387. **DWB** (M(06) 1611g)—A seven-year study has been made on the rainfall, soil dampness, the varying levels of underground water, the temperature, evaporation, and the degree of the humidity in the air in the marshy area close to the testing station of Königsmoor. The report reveals that the influence of this highly productive marshy area on the climate of Königsmoor is unfavorable. During the summer

humidity is greatest in the air because of the excessive evaporation that comes through the dense growth. *Subject Headings:* **1. Marsh land microclimates 2. Water balance of marsh land 3. Königsmoor, Germany.**—*N.N.*

10.8—334 551.584.4

Kakas, József and Kéri, Menyhért, **Néhány szó az állományéghajlat kutatásának céljáról.** [Note on the purpose of research on the climate of plant cover.] *Időjárás*, Budapest, 61(6)-445–449, Nov./Dec. **1957. DLC**—In connection with a meeting of the agrometeorological committee of the Hungarian Academy of Science (Nov. 27, 1957), the authors deplore the fact that research on the microclimate of plants is being conducted without a real understanding of the type of information which would be of practical value to farmers. Agrometeorological forecasting is considered to be the final goal toward which all plant microclimatology research should be directed. *Subject Headings:* **1. Plant microclimatology 2. Agrometeorological forecasting.**—*G.T.*

10.8—335 551.584.43:577.4(62)

Boyko, H., and Boyko, E. (*Israel*), **A climate map of the Sinai Peninsula as example of ecological climatography.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 2, Phytological Bioclimatology), **1957.** 3 p. 6 figs. **DWB**—The methods of ecological climatography are applied to the construction of a climatic map of the Sinai Peninsula. These methods are general comparison of the geographical distribution of both vegetation types and single species, geo-ecological law, occurrence of species with a particular narrow ecological amplitude, biological rule of climatic extremes, calculation of the gradient of aridity in a vertical and horizontal direction, and the method of overlapping amplitudes. Also some meteorological data from the Mediterranean and Red Sea shore were used. The characteristics of the plant indicators, their distribution as an index of climatic conditions and the construction of the map are discussed. Graph showing the overlapping of ecological amplitudes for several localities and curve of the altitudinal gradient of precipitation and theoretical isohyets on the hypothetically flat area and a climatic map of the Sinai Peninsula are presented. *Subject Headings:* **1. Ecoclimatography 2. Climatic charts 3. Sinai Peninsula.**—*I.L.D.*

CLIMATIC CLASSIFICATION

See also: **Climate, Rio de Janeiro, Brazil** (Bernardes), 10.8–326; **Water blance of marsh land, Königsmoor, Germany** (Baden, Eggelsmann), 10.8–333.

10.8—336 551.585:551.581(47)

Alisov, B. P., **Printsipy klimaticheskogo raĭonirovaniia SSSR.** [Principles of climatic regional classification of the U.S.S.R.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.*, No. 6: 118–125, **1957.** map (fold.), 7 refs. **DWB**—On the basis of characteristics of the atmospheric circulation and the transformation of air masses under the influence of radiational elements, the territory of the U.S.S.R. can be classified into four latitudinal climatic zones. These are: Arctic, Subarctic, middle latitude and subtropical zones. In the Arctic zone, Arctic air masses prevail throughout the entire year; in the middle latitudes, middle latitude air masses interact with arctic and tropical air masses; the Subarctic and Subtropic zones are characterized by the alternation of arctic and middle latitude air masses in the former and middle latitude and tropical air masses in the latter. The Arctic zone is subdivided into 4 regions: cis-polar in which the effect of surrounding Arctic continents and oceans are least evident; Atlantic, east-Siberian and Pacific. The Subarctic zone is subdivided into (1) the Atlantic subarctic region which is dominated by cyclonic activity along the Arctic front; (2) the Siberian subarctic region, the climate of which is primarily the result of radiational factors; and (3) the Pacific subarctic region which is under the influence of cyclonic activity along the Arctic front. The temperate zone consists of the following climatic regions: (1) Atlantic-Arctic forest region; (2) Arctic-continental forest and forest steppe region; (3) The continental forest (and forest steppe)—western Siberian region, (4) Continental forest (and forest steppe)—eastern-Siberian region; (5) Monsoon forest and forest steppe region of the Far East; (6) Pacific Ocean forest region; (7) Atlantic continental steppe region; (8) The continental steppe West Siberian region; (9)

Mountainous climatic region of Altai and Sayan; (10) Mountain region of the northern Caucasus; (11) Continental desert region of Tien Shan. Finally, the following regions constitute the subtropical zone: (1) western Transcaucasus region; (2) eastern Transcaucasus region; (3) mountain region of the Transcaucasian foothills; (4) the desert south Turanian region; (5) and the mountain region of Pamir-Altai. Qualitative description of the climatic characteristics of each region and a map of the climatic regions of the U.S.S.R. are presented. *Subject Headings:* **1. Climatic classifications 2. Climatic zones 3. Climate of U.S.S.R. 4. U.S.S.R.**—*I.L.D.*

10.8—337 551.585

Nosek, Miloš, **K metodice klimatické klasifikace a výzkumu pro účely krajinného plánování.** [Methodology of climatic classification and research for purposes of regional planning.] *Meteorologické Zprávy*, Prague, (10)6: 157–161, **1957.** table, 5 refs. **DWB**—From a critical review of the climatic classification schemes of Gregor (1944), Boer (1952) and Uhlig (1954), the author derives principles to be followed in macro- and micro-climatic classification. The various meteorological elements to be used in such classification and their parameters, significant from the point of view of human activities, are discussed. Emphasis is placed on the need for local measurements to verify the results of climatic indexing. *Subject Headings:* **1. Climatic classifications 2. Regional planning.**—*G.T.*

10.8—338 551.585.5

†Budyko, M. I., **Klimaticheskie pokazateli aridnosti.** [Climatic aridity indexes.] (In: Vsesoiuznoe Geograficheskoe Obshchestvo SSSR, **Voprosy Geografii.** Moscow, **1956.** p. 138–145. 34 refs., 5 eqs.) **DWB, DLC** (G58.G35)—A theoretical paper in which the author, after reviewing briefly papers dealing with investigations of climatic conditions of moistening, introduces a formula establishing the connection between components of water and heat balance. As a consequence of this, it can be considered that the geographical distribution of the radiational aridity index is directly linked with the location of natural zones differing by moisture conditions. The aridity index is now extensively used in various climatological and geographical investigations. *Subject Headings:* **1. Arid zone climatology 2. Aridity index.**—*A.M.P.*

BIOCLIMATOLOGY

See also: **Tropical vegetation symposium, 10.8–5; Thallasotherapy texts.** (Haeberlin, Goeters), **10.8–11; Cold injury studies, Antarctica** (Sapin-Jaloustre), **10.8–58; Coffee res. and irrigation, Kenya** (Jones, Wallis), **10.8–121; Hay drying and rainfall probabilities, Wyoming** (Becker et al.), **10.8–321.**

10.8—339 551.586:577.

Bobek, Hans, **Die klimaökologische Gliederung von Iran.** [Climatic-ecological classification of Iran.] *International Geographical Congress, 17th, Wash., D. C., Aug, 1952, Proceedings*, pub. **1956?** p. 244–248. fig., table, 6 refs. **DWB** (912.I61p)—This climatic ecological classification of Iran is based upon the distribution of moisture and heat. The vegetation characteristics of humid and arid forests and the distribution of cultivated plants with altitude are described. The climatic ecological regions of Iran are illustrated on a map. (For abstract on article with similar title from another source, *see* 3.10–229, Oct. 1952, *MAB.*) *Subject Headings:* **1. Ecoclimatology 2. Ecoclimatography 3. Iran.**—*I.L.D.*

10.8—340 551.586:595.7

Sullivan, C. R. (*Canada*), **Weather and the white pine weevil.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 3, **Zoological Bioclimatology**), **1957.** p. 3 figs. **DWB**—The life cycle and ecology of the white pine weevil with special stress on the role of atmospheric conditions prevailing on its habitat are discussed. The influence of climate on the behavior of weevil activity is illustrated by curves showing that general activity increases as bark temperature increases from 8 to 32°C and decreases to zero from 32°C to 35°C. In terms of the bark temperature of the leader, the insects are active within a range which is higher by 2–4°C than the comparable air temperature range. With increasing relative humi-

ity, activity may cease; the influence of relative humidity is increased as the bark temperature of the leader is raised. By reducing the penetration of light to young pine, a hardwood canopy may be correlated with a change in the climate of weevil habitats. An increase in atmospheric moisture is associated with reduction in light and temperature in shaded weevil habitats so that even during warm sunny days many shaded habitats never favor weevil development and reproduction. Climatic conditions especially favorable to the development and survival of the white pine weevil occur in open-grown stands during warm, sunny years while the introduction of overlong shade changes the stand climate until it becomes unsuitable for rapid weevil development or survival. *Subject Headings:* **1. Weather effects on weevils 2. Weevils.**—*I.L.D.*

10.8—341 551.586:612(438)

*Boniecka-Zółcik, Helena, **O wartościach wielkości ochładzania na Polskim wybrzezú.** [Cooling power data for the Polish coast.] *Przegląd Geofizyczny*, Warsaw, 2(4):243–248, **1957.** 4 tables. French summary p. 48. **DWB, DLC**—Results of cooling power measurements carried out with katathermometers at Gdynia, Kołobrzeg, Ustka and Międzyzdroje during 1951–1955, showing the mean monthly and annual, as well as the maximum and minimum cooling power values and the frequency of their appearance in various seasons are presented in tables and discussed. It has been found that the Polish coastal climate is stimulating and characterized by high cooling power values, both mean and extreme. According to Petrovič and Kacvinský scale, it is possible to distinguish the following climatic periods: a mild, an agreeably fresh, and a cool period. *Subject Headings:* **1. Cooling power data 2. Climate of Polish coast 3. Poland.**—*A.M.P.*

10.8—342 551.586:612:551.43

Jungmann, H. **Zur Periodik der Akklimatisation an mittlere Höhen.** [Period necessary for acclimatization at medium elevations.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (**Pt. 4, Human Bioclimatology**), **1957.** 2 p. 5 refs., eqs., table. **DWB**—Duration of time necessary for acclimatization to high altitude (2000–2200) was investigated in 44 healthy individuals and in 26 patients suffering from circulatory disturbances (hypo- and hypertensive disturbances, hyper-thyroid and myxodema). The indicator of circulatory changes was the resting minute volume calculated by the formula

$$V_m = \frac{60\Delta p.S.Q}{2.q.Pwg.D},$$

where Δp—blood pressure amplitude, Q—cross section diameter of the aorta, q—density of blood (1.06), Pwg—pulse wave velocity, S—systole time and D—diastole time. At high altitude the resting minute volume differed from that at lower altitudes. Those periods with increased resting minute volume were established, namely: 2 to 4 hrs, 4 to 7 days and 16 to 18 days after arrival at high altitude; there were three periods with reduced resting volume, namely: ½ to 1 hr, 1 to 3 days, and 9 to 17 days after arrival at high altitude. During the periods of increased resting minute volume, intensified reactions to stress experiments were manifested. *Subject Headings:* **1. High altitude acclimatization 2. Mountain bioclimatology.**—*I.L.D.*

10.8—343 551.586:612 313:629:551.515.3

§Köhn, Werner, **Verkehrsunfälle in biosynoptischer Sicht.** [Traffic accidents from a biosynoptic viewpoint.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 13:88–93, **1958.** 4 figs. **DWB**—The previously established relationship (for Hamburg) between traffic accidents and cyclogenetic processes (middle and upper troposphere weather phenomena) has led to an attempt to follow the movement of traffic accident peaks with the movement of cyclogenetic processes across northwestern Europe. Three synoptic situations involving 750,000 traffic accidents are analyzed. In the case of the low which moved eastward across Holland to northern Germany (23 Jan. 1956) increases in traffic accidents followed the direction of movement of the cyclone. Persistent rainfall within the cyclone area did not seem to influence the number of traffic accidents. For the various examples cited the author presents synoptic charts showing the movement of the low pressure areas and 1-2-3σ isopleths of the

traffic accident occurrences. In appendix the author presents an analysis showing that street wetness has a less significant relationship to traffic accidents than cyclogenetic processes. *Subject Headings:* **1. Cyclogenetic effects on traffic accident 2. Traffic accidents and cyclogenesis.**—*I.L.D.*

UPPER AIR CLIMATOLOGY

See: **Aerological research** (Van Mieghem) 10.8–48.

ENVIRONMENTAL INFLUENCES

See also: **Strawberry culture and slope climatology** (Suzuki et al.), 10.8–114; **Thermal structure of lower atmos.** (Taylor), 10.8–249; **Fog precip. and vert. precip. variations, Bavaria** (Baumgartner), 10.8–285; **Forest influences on snow accumulation, Europ. U.S.S.R.** (Rakhmanov), 10.8–306.

10.8—344 551.588.6:551.588.2

MacHattie, L. B. (*Forestry Branch, Dept. of Northern Affairs and National Resources*), **Topoclimatology and the representativeness of observations.** *Royal Meteorological Society, Canadian Branch, Publication*, 8(5):1–9, Nov. **1957.** 4 figs., table, **DWB**—The atmosphere is too extensive in space, and too variable in time for a meteorologist to keep track of all of it. We each specialize our attention. The aviation meteorologist lives mainly in the "free air," and only comes down to earth on certain artificially smoothed out areas (airports). He sees the broad sweep of atmospheric motions, neglecting as far as possible the fine scale complications at its surface. The public forecaster is obliged to give these surface complications some consideration. But the forest meteorologist is completely embedded in them. Aloft, acre-sized cold or warm pockets of air may be neglected as having equally transient effects at all points as they drift with the wind. But near the ground cold and warm pockets do not drift along and "average out." They are tied to the topography. A tree may spend its whole blighted life in one cold pocket. For the aviation meteorologist the main spatial variations of weather are delineated by the synoptic network, and the fine scale spatial variations are derivable from series of observations at single stations. There is no such easy conversion from time-variation to space-variation for the forest meteorologist. Since time-variations are so much easier to measure than space-variations, our accumulated mass of meteorological data leans heavily in this direction. Consider surface temperature observations. At airway weather stations we can be confident year after year that no significant temperature changes goes unobserved. But in between the observing stations how many significant changes occur between dry upland and moist lowland, between windward slopes and sheltered areas—significant differences which are never observed? *Subject Headings:* **1. Topographic effects 2. Forest meteorology 3. Representativeness of observations.**—*Author's abstract.*

SYNOPTIC CLIMATOLOGY

See: **Climate and weather, No. Greenland** (Hamilton), 10.8–144.

MISCELLANEOUS

COSMIC INFLUENCES

10.8—345 551.590.21:523.746(4) 551.524.35(4)

Dinies, E., **Temperature of midwinter and preceding solar activity.** Germany. Deutscher Wetterdienst, Frankfurt/Main, Contract AF 61(514)-954-C, Scientific Report, No. 1, Oct. **1956.** 9 p. tables, ref., eqs. **DWB** (M90.21 G373sc)—A study of the temperature anomaly of the Central European midwinter has been investigated. It is represented as a function of the sunspot numbers of the month preceding Jan. and Feb. and as a function of the change of sunspot numbers in comparison with the following month. A summary of the results of the existing relations is tabulated. No uniform result was gotten for the investigations on

the circulation anomalies in Europe during Oct., Nov. and Dec., but there was an increase of sunspot number during July through Nov. Five correlation tables for temperature anomalies are given in the Appendix. *Subject Headings:* **1. Temperature anomalies 2. Sunspot-temperature relationships 3. Central Europe.**—*N.N.*

10.8—346 551.590.21:551.583.7

Öpik, Ernst J., **Climate and the changing sun.** *Scientific American*, N. Y., 198(6):85–92, June **1958.** figs., table. **DLC**—Drastic changes in the climate of the sun have occurred during the past eons of geologic time. Theories on dust clouds from volcanic eruptions and on orbital changes in the earth have been propounded. Studies reveal the various million years of past glacial ages. Man is now in one glacial age that started a million years ago. This article presents a new hypothesis on temperature-life changes on our earth. Explanation is given to what hitherto was merely an assumption; how the radiated energy from the sun may have varied and caused Ice Ages on earth. During 90% of the past 500 million years the global average temperature was 72°F. At the present it is 58°F. Heat output from the sun and the rate at which it varies have affected temperature on earth. *Subject Headings:* **1. Climatic changes 2. Solar terrestrial relationships 2. Geological climates.**—*N.N.*

10.8—347 551.590.21

Roberts, Walter Orr, **Sun clouds and rain clouds.** *Scientific American*, 196(4):138–148, April **1957.** 9 figs. **DWB, DLC**—The author demonstrates how the corpuscular emissions from the sun could possibly affect the weather on earth—about 14 days after the earth passes through the stream of particles. These particles are encountered more often in years of high solar activity. Ideas of FARTHING, HARRISON, CRAIG, SHAPIRO, WILLET, NAMIAS and others are cited. The possible mechanisms which have been suggested are reviewed and the economic value of better predictions which research along these lines could produce, are listed. A break in weather at Denver that occurred 12 days after a solar cloud (April 17, 1955) is demonstrated. *Subject Headings:* **1. Solar-weather relationships 2. Corpuscular emissions from sun 3. Denver, Colo.**—*M.R.*

VISIBILITY

10.8—348 551.591:551.507.362.1

Duntley, Seibert Q., **Atmospheric limitations on missile photography.** *Society of Motion Picture and Television Engineers, N. Y., Journal*, 67(4):231–233, April **1958.** 3 figs., table, 2 refs., eqs. **DLC**—On the basis of optical data taken from an aircraft flight as well as data secured at ground level, the obscuration of high-flying missiles by the atmosphere is ascertained and the requirements to be met by telescopic finders and cameras are specified for several typical weather and lighting conditions. *Subject Headings:* **1. Missile photography 2. Visibility of missiles.**—*Author's abstract.*

OPTICAL PHENOMENA

See also: **Halos in historic records** (Berg), 10.8–70; **Dust layers and twilight phenomena** (Megrelishvili), 10.8–185; **Radio wave polarization** (Bailey), 10.8–192.

10.8—349 551.593.11

Affronti, Filippo, **Analisi di un miraggio nelle Egadi.** [Analysis of a mirage over the Egadi Islands.] *Rivista di Meteorologia Aeronautica*, Rome, 19(1):35–38, Jan./March **1959.** fig., ref., eqs. Italian, French, English and German summaries p. 35. **DLC**—In March 1958, a case of mirage was reported to the southwest of the islet Favignana (Egades Islands), which initially gave rise to a widely spread belief that a new volcanic island was going to emerge from the sea, which sometimes before had really happened. An explanation of this optical phenomenon is here expounded, according to the Wegener theory. *Subject Headings:* **1. Mirages 2. Egadi Islands.**—*Author's abstract.*

10.8—350 551.593.53:551.521.17

Sekihara, K. (*Met. Research Institute*), **Studies of the distribution of ultraviolet sky radiation, Pt. 3, Deduction of the mathematical expressions of the absorption layer.** *Papers in Meteorology and Geophysics*, Tokyo, 3(2):94–103, Aug. 1952. 4 figs., table, 3 refs. Also his: **Appendix to [Pt. 3]**, *Ibid.*, 6(1):98–99, May **1955.** Also **Pt. IV. On the effect of solar eclipse.** *Ibid.*, 3(3):183–194, Jan. **1953.** 3 figs., 4 tables, 7 refs. Also **Pt. 5, On the optical thickness of the atmosphere.** *Ibid.*, 3(4):277–285, March **1953.** 4 figs., 4 tables, 10 refs., eqs. Also **Pt. 6.** *Ibid.*, 4(3/4):97–103, Dec. **1953.** 4 figs, table, 8 refs., 5+ eqs. **DWB**—In Pt. 3, using the expressions developed in Pt. 2 of this paper (*see* item 4.3–144, March 1953, *MAB*), the author deduces "formulae of primary and secondary scattered sky radiation with an infinitely thin absorption layer and one of finite thickness." In Pt. 4 the author offers a more complete analysis of the anomalous distribution of ultraviolet sky radiation observed on Rebun Island on May 9, 1948 and discussed in respect of primary scattering in Pt. 1 of this paper (*see* 2.4–98, April 1951, *MAB*). Values of primary and secondary scattering are tabulated and discussed. In Pt. 5 the author's formulas for primary and secondary scattering are applied to zenith angles from 0 to 60° at 60° and 30° elevations of the sun. The theoretical results are presented in tables and curves and compared with measured values. Some cases of abnormally high relative intensity are discussed. In Pt. 6 the author's equations are evaluated numerically, depending on zenith angle. Various types of absorption layers are assumed, the main effect being a decrease of the secondary scattering. Results are graphically presented for an infinitely thin absorption layer of varying height and for an absorption layer of finite thickness with varying lower limit. *Subject Headings:* **1. Ultraviolet sky radiation 2. Scattering of light 3. Upper atmosphere.**—*A.A., G.T.*

10.8—351 535.8:551.593.7

Gaume, François, (*Laboratoire Aimé Cotton, Bellevue S.-et-O.*), **Monochromateurs utilisés en polarimétrie.** [Monochromators used in polarimetry.] *Revue d'Optique*, Paris, 37(5):242–260, May **1958.** 10 figs., table, 15 refs., eqs. **DLC**—(1) The use of approximately monochromatic light is studied systematically as to its bearing on polarization measurements. The parasitic light, when its wave length is far from that of the investigated radiation, may result in intolerable systematic deviations and considerably enhance the uncertainty of settings. On the contrary, no trouble is given by a small ratio of parasitic light having a wave length near that investigated. (2) The distribution of regularly transmitted light as well as of parasitic light are re-examined and developed in the case of a prism monochromator. (3) Subsequently, when a double monochromator is absolutely needed, two modifications are pointed out which make much easier and cheaper both building and adjustment of such an instrument designed for polarimetry, without reducing its performance as to the specified purpose. The foregoing remarks can be extended to various types of radiation separators used in polarimetry and may be applied to some other optical measurements. *Subject Headings:* **1. Monochromators 2. Polarimetry 3. Optical measurement.**—*Author's abstract.*

ELECTRICAL PHENOMENA

See also: **Ionosphere turbulence-electrical phenomena relationships** (Booker), 10.8–131; **Radar echoes from lightning** (Ligda), 10.8–135; **Electron density in F layers** (Al'pert), 10.8–189; **Thundercloud elec.-precip. rel., Bavarian Forest, Germany** (Israël, Tewes), 10.8–299.

10.8—352 551.594:550.387

Experiments which show that the earth functions as an electrostatic machine. *Scientific American*, New York, 196(5):158–170, May, **1957.** 6 figs., **DLC**—The earth is a huge electrostatic generator of the Van de Graaff type, which accounts for seemingly inexplicable phenomena. The two generators differ markedly in detail, however: in the case of the earth the spheres are concentric and the atmosphere a poor insulator. Thunderstorms provide a means of charging. The intensity of the electric field decreases about 100 volts per yard, or 200 volts between a man's head and feet, and as much as 3000 volts per foot under a thunderstorm. Field intensity is higher on mountains or steep hills than at sea, or on prairies, and lower still

in valleys. Methods of measuring the earth's field intensity and details of construction of a portable field mill and, finally, of a Van de Graaff generator (for amateurs), are discussed and the generator illustrated schematically. *Subject Headings:* **1. Earth's electric field 2. Atmospheric electricity 3. Van de Graaff generators.**—*M.R.*

10.8—353 551.594.12:551.574.11

Kawano, M. (*Electro-Technical Lab., Tokyo*), **The influence of the vertical distribution of the nuclei content on the vertical distribution of the air resistivity in the exchange layer.** *Meteorological Society of Japan, Tokyo, Journal,* 36(2):67–72, April **1958.** 2 figs., 11 refs., 21 eqs. **DWB, DLC**—Discussing the ionization equilibrium and taking into consideration the influence of eddy diffusion, the writer (1) calculated the vertical distribution of the air resistivity in the exchange layer. In this calculation, the nuclei content was assumed to be constant with height. In the present paper, the vertical distribution of the nuclei content is assumed to be given by the exponential form, and the influences of the several coefficients of the decrement on the vertical distribution of the air resistivity in the exchange layer were calculated. *Subject Headings:* **1. Ionization equilibrium 2. Nuclei vertical distribution.**—*Author's abstract.*

10.8—354 551.594.13:551.576.11

Krasnogorskaia, N. V., **Izmenenie elektricheskoĭ provodimosti vozdukha v razlichnykh meteorologicheskikh usloviiakh.** [Variations in the electrical conductivity of the air under various meteorological conditions.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich,* No. 4: 527–535, April **1958.** 3 tables, 7 figs., 12 refs. **DLC**—Transl. into English by John Miller, issued by American Meteorological Society under Contract AF 19(604)-1936. Sept. **1958.** 16 p. The results of measurements of atmospheric conductivity on Elbrus during clear, cloudy and rainy days are analyzed. The electrical conductivity was measured by means of the aspiration method. The apparatus (illustrated by a photograph) consisted of a cylindrical condenser having either a positive or negative charge on its outer electrode. The air aspirated at a velocity of 7 m/sec. The atmospheric electricity field was recorded simultaneously with a radioactive collector or a dynamic field meter. When the potential gradient of the electric field is large, the conductivity of the atmosphere at the surface of the earth diminishes independently of the state of the weather since the increase in the absolute value of the electrical field is accompanied by a sharp decrease in the density of ions having a sign opposite to that of the vertical component of the potential gradient of the electric field. In the case of strato-cumulus clouds, the atmospheric conductivity decreases considerably because of the interaction of cloud droplets with both positive and negative ions. The predominating adsorption of negative ions by cloud droplets in strato-cumulus clouds at the surface of the earth is lacking. *Subject Headings:* **1. Electrical conductivity measurements 2. Cloud effects on electrical conductivity.**—*Author's summary and I.L.D.*

10.8—355 551.594.2:551.576.11

Fitzgerald, Donald R. (*Chicago Univ.*), **Some theoretical aspects of the relation of surface electric field observations to cloud charge distributions.** *Journal of Meteorology,* Boston, 14(6):505–512, Dec. **1957.** 13 figs., table, 3 refs., 16 eqs. **DWB, DLC**—A study of analytic solutions to sets of equations describing surface electric fields in terms of point charge distributions indicates certain conditions concerning the values of electric field in relation to the coordinates of the measurement sites that must be satisfied if real solutions to the simultaneous equations are to be achieved. A new representation of the surface electric field in terms of cloud monopole and dipole moments is given. Methods of calculating these moments from observed field disturbances and radar measurements of the cloud position and motion are developed. An example of the technique is applied to a winter convective shower situation measured in central Illinois. *Subject Headings:* **1. Electricity of disturbed weather 2. Cloud charge distribution.**—*Author's abstract.*

10.8—356 551.594.21

Tamura, Yuichi, **Electrification of minor showerclouds: systematic detailed investigations of the electrification in minor showerclouds which appear in the cold season and have a dimension of the order of 2–3 km.** Kyoto. Univ. Geophysical Institute, Contract AF 62(502)-1219, Final Report, June 14, **1956.** 21 p. 38 figs., 3 eqs. **DWB** (M94.2 T159eL)—Observations

were made of electric fields in cold season shower clouds with a field meter at 10 stations in the northeastern part of Kyoto. The field meter was of the Workman-Gunn generating voltmeter type originally devised by M. KASEGAWA (1940), with a recording milliammeter and a vacuum tube amplifier. Ten cases out of 200 shower clouds studied in Dec. 1955–March 1956 are analyzed and the records presented in various ways. The report discusses the meteorology of the winter showers, observation sites, instruments, reduction of data from records, electric maps, methods of electric field analysis, and of analysis of individual shower cloud fields, polarity and charge magnitude of minor shower clouds and, finally, the movement of the charged portion of a cloud and the air flow. Aerological data are used in analysis to show temperature and winds at charge centers. Seven of the ten cases studied showed negative polarity in cloud, and 3 positive. The bipole axis inclines in the direction of movement of bipoles, usually the lower charge goes ahead, and is smaller than the upper one. The charges usually move with the air currents, but in 2 cases did not. *Subject Headings:* **1. Thunderstorm electricity 2. Electrical charging of clouds 3. Polarization of shower clouds 4. Kyoto, Japan.**—*M.R.*

10.8—357 551.594.221:550.38

Norinder, Harald, **Magnetic field variations from lightning stokes in vicinity of thunderstorms.** *Arkiv för Geofysik*, Stockholm, 2(20):423–451, **1957.** 39 figs., table, 10 refs. **DLC**—Results of measurements carried out by the frame aerial method at several field stations during 1953 and 1954 are reported. Experimental details are outlined and the dependence of the magnetic field with its structure variations on the lightning paths, including multiple strokes, is described, comparing lightning photos with oscillograms. Further discussions are devoted to the polarity of lightning discharges and the vertical versus horizontal field components. The lightning stroke is considered as the final stage of a slowly developing mechanism. A statistical treatment of the magnetic field variations includes the duration of variation forms, frontal variations, superimposed quasi-periodic variations, as well as the statistical distribution of multiple strokes and the variation of the magnetic field force with distance. *Subject Headings:* **1. Thunderstorm electricity 2. Magnetic field variations during lightning 3. Sweden.**—*A.A.*

AURORAS

See also: **Radar echoes from auroras** (Birfel'd), 10.8–129; **Processes in the upper atmos.** (Shklovskiĭ), 10.8–187.

10.8—358 551.594.5:550.385

Bennett, Willard H. (*Nucleonics Div. USN Research Lab.*), **Auroral and magnetic-storm theory.** *Astrophysical Journal*, Chicago, 127(3):731–742, May **1958.** 4 figs. (incl. photos), 2 tables, 30 refs., eqs. **DWB, DLC**—Experimental proof that the ionized interplanetary matter near the earth has a density of the order of 500 charge pairs per cubic centimeter invalidates the old SCHUSTER, LINDEMANN, and FERRARO criticisms of charged particle-stream theories of the aurora. Experimental evidence is presented and analyzed to show that none of the neutral ionized-stream theories can account for the principal board characteristics of the aurora and magnetic storms. Arguments are presented to show that the magnetically self-focusing solar proton-stream modification of the original BIRKELAND-STÖRMER theory accounts for the principal characteristics of auroras and magnetic storms quite naturally. Definitive tests of the proton-stream theory are proposed. *Subject Headings:* **1. Auroral theories 2. Magnetic storm theories.**—*Author's abstract.*

10.8—359 551.594.5

Iudin, Iu. L., **Poliarnoe siianie 11 fevralia 1958 g.** [Aurora of Feb. 11, 1958.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:38, June **1958.** **DWB, DLC**—An aurora was observed on Feb. 11, 1958, between 1730 and 1800 h (Moscow time) at the Eisk marine hydrometeorological station on the shore to Taganrog Gulf of the Sea of Azov (lat. 46°44′N). For these localities this is a rare event. Part of the horizon from northwest to north was a dark orange color. At times the color intensified and weakened. With increasing brightness the color

extended almost to the zenith. A narrow band of alti-stratus clouds was observed at the line of the horizon. An aurora was observed at this station also on Sept. 30, 1957 between 2000 and 2300 h. *Subject Headings:* **1. Aurora of Feb. 1958 2. Sea of Azov.**—*I.L.D.*

10.8—360 551.594.5:550.385:551.510.535:539.19

†Matsushita, S. (*High Altitude Obs. of the Univ. of Colorado, Boulder*), **Some studies of the upper atmosphere in the auroral zone.** *Annales de Géophysique*, Paris, 14(4):483–491, Oct./Dec. **1958.** 3 figs., 28 refs. French and English summaries p. 483. **MLC**—Relations between ionospheric and geomagnetic phenomena in the auroral zone were studied from magnetograms and ionograms both made at the same station by correlating striking features in each. When a bay disturbance of moderate range occurred at night, complete blanketing of F_2 by sporadic E always happened at the time. When the range of bays was larger, blackouts usually occurred after the incidence of complete blanketing of F_2. Slant E_s occasionally appeared during bays, and it never occurred except during bays or bay-type variations during magnetic storms. Blackouts which occurred during daylight hours had no remarkable correlations with geomagnetic variations except during magnetic storms. In other words, there were two different types of the polar blackout: nighttime and daytime types. The height of the absorbing region responsible for the polar blackout during daylight hours seemed to be lower than that at night. In order to explain these results, the effect on the ionosphere of X-rays generated by the primary particles from the sun are discussed. The cause of magnetic bay disturbances is also considered. *Subject Headings:* **1. Auroral zone 2. Magnetic storms 3. Polar blackouts 4. X-ray effect on ionosphere 5. Magnetic bay disturbances.**—*Author's abstract.*

10.8—361 551.594.5:550.386

Van Sabben, D., **Het poollicht van 4 September 1958.** [The polar aurora of Sept. 4, 1958.] *Hemel en Dampkring*, The Hague, 56(11):206–208, Nov. **1958.** 3 photos. **DWB, DLC**—The polar aurora of Sept. 4, 1958 was one of the most important observed since 1938 in the Netherlands. The day before, the magnetic station at Witteveen registered a sudden commencement of a perturbation in the earth's magnetic field. A weak magnetic storm followed and the polar aurora was visible for one hour. A strong magnetic storm developed in the evening on Sept. 4, and the polar aurora could be observed from 20h45 until 04h50. The course of the phenomenon is described in detail. *Subject Headings:* **1. Aurora of Sept. 4, 1958 2. Sudden commencements 3. Witteveen, Netherlands.**—*A. V.*

PART II. ANNOTATED BIBLIOGRAPHY ON EVAPORATION MEASUREMENT

By: *Robert Panara*

INTRODUCTION

The meteorological phenomenon known as evaporation has long been a subject of deep concern in those geographical areas where evaporation exceeds rainfall and where the water loss involves real economic and physical hardships. Much progress has been made in the attempt to measure the amount of evaporation losses by way of such inventions as the Piche gauge, the Wild balance and the Popov evaporimeter, but the large-scale evaporation from various land and water surfaces is often so great and sustained as to minimize our efforts toward measurement and control.

It is in consideration of such difficulties and problems that the present series of bibliographies is being compiled. Succeeding bibliographies on **Evapotranspiration (–1955), Evapotranspiration (1956–1959)** and **Evaporation from Specific Surfaces** will appear, respectively, in Sept., Oct. and Nov. 1959.

This bibliography is by no means exhaustive; however, it does represent a cross section of the varied material on evaporation instruments and measurement techniques which has come to our attention since the previous bibliography on the subject (*see* p. 733–762, Vol. 1, No. 11, Nov. 1950, *MAB*).

This bibliography was prepared for and with support from the U. S. Army Electronic Proving Ground, Fort Huachuca, Arizona.

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10H–1 551.573

*Carton, P., **Considérations sur l'importance et les méthodes de mesure de l'évaporation en météorologie agricole.** [Considerations on the importance and the methods of measuring evaporation in agricultural meteorology.] *French Indochina. Service de la Statistique Générale, Bulletin Economique de l'Indochine*, Sec. B., 34:900–933, Oct. **1931.** photos, diagr. tables, refs.—Article deals mostly with instrumental and procedural problems. The Piche evaporimeter used at the Central Observatory, Phu-Liên (Hanoi), is described in particular, along with type of shelter and problems. Tables give comparative data for the different types of shelters tested at Phu-Liên and at Phu-Hô. Other evaporimeters are briefly described. Finally, tables of monthly evaporation means, 1925–1931, and of monthly means for 1930, at various stations of Indochina using Piche evaporimeter are appended. (*Same item as* 5B–113, Feb. 1954, *MAB.*) *Subject Headings:* **1. Evaporation 2. Evaporimeters 3. Agricultural meteorology 4. French Indochina.**

10H–2 551.573:551.551

Dörffel, K. and Lettau, Heinz, **Der Wasserdampfübergang von einer nassen Platte an strömende Luft.** [Water vapor transfer from a wet plate to an air stream.] *Annalen der Hydrographie und Maritimen Meteorologie*, 64:342–352, 504–510, **1936.** 9 figs., 10 tables, 21 refs., eqs. **DLC**—A technical article on the measurement of evaporation and related problems of heat exchange. The necessity of including the fetch or length of air trajectory over the moist surface in calculations of evaporation and moisture transport, is brought out. Size of evaporation reservoir is, therefore, of prime importance in instrumentation. Applications to problems of micro- and bioclimatology, as well as to synoptic and marine observations and to energy exchange studies over the continents and oceans, considered. (*Same item as* 4B–93, Feb. 1953, *MAB.*) *Subject Headings:* **1. Evaporation 2. Turbulent transfer of moisture 3. Energy exchange.**—*M.R.*

10H–3 551.573:551.508.7

*Young, Arthur A. (*U. S. Soil Conservation Ser., Agri. Dept.*), **Investigations of evaporation from screened pan and development of a coefficient for the conversion of pan evaporation to lake evaporation.** A report of evaporation investigations by the Division of Irrigation, Soil Conservation Service in cooperation with the Div. of Water Resources, Dept. of Public Works, State of California. Pomona, California, Sept. **1942.** 160 p. 4 figs., 34 tables, 3 refs. Mimeo. **DWB**—A careful comparison of the evaporation from 1) U. S. Weather Bureau pans, 2) 12′ pans, 3) lakes and 4) a screened ground pan 2′ in diameter, 3′ deep, set in the ground 2.75′, using a screen with 4 or 6 meshes per inch were made at 4 places in Southern California. The evaporation from the screened pan is almost the same as from 12′ pans or large bodies of water (annual reduction factor 0.98, with 4 mesh screen, and 0.99 for pans with 6 mesh screens). All data measured during several years are given with monthly summaries (evaporation, temperature, wind, rainfall, relative humidity). (*Same item as* 6.10–210, Oct. 1955, *MAB.*) *Subject Headings:* **1. Evaporation data 2. Pan evaporimeters 3. California I. U. S. Soil Conservation Service II. California, Div. of Water Resources.**—*A.A.*

1945–1949

10H–4 551.573:551.508.7

*Young, Arthur A. (*U. S. Soil Conservation Ser., Agri. Dept.*), **Evaporation investigations Southern California.** A report of evaporation investigations by the Division of Irrigation, Soil Conservation Service, in cooperation with the Division of Water Resources, Department of Public Works, State of California. Pomona, California, April **1945.** 89 p. 11 figs., 56 tables, 15 refs. Mimeo. **DWB**—Evaporation data from various types and sizes of pans in comparison with meteorological conditions are given for 5 yrs and are summarized in a comprehensive study. The following coefficients for the reduction to the annual evaporation from a 12′ pan are obtained: 1) For circular ground pans, each 3′ deep

diameter	12′	6′	4′	2′	1′
coefficient	1.00	.91	.89	.81	.66

2) For different types of pans: Bureau of Plant Industry, 0.94; Colorado pan .89; Insolated pan .8 Weather Bureau pan .77; Screened pan. 98. The percent of evaporation from a new galvanized p varies from 83 for white color pan to 107 for an unpainted copper pan. Equipment and exposures a shown in photographs. (*Same item as* 6.10–209, Oct. 1955, *MAB.*) *Subject Headings:* **1. Evapor tion data 2. Evaporimeter comparisons 3. Pan evaporimeters 4. California. I. Blaney, Ha F. II. U. S. Soil Conservation Service III. California. Div. of Water Resources.**—*A.A.*

10H–5 551.501:551.5

Budyko, M. I., **Izmerenie estestvennogo isparenіia.** [Measurements of natural evaporatio *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Trudy Nauchno-Issledovatel'skikh Uch*

denii, Ser. 1, Meteorologiia, No. 34: 83–92, **1946.** fig., 6 refs. **DLC**—Two principal methods for etermining the total evaporation from soil surface are mathematically analyzed. The first is the -called gravimetric method (periodical weighing of monoliths (cores) of soil with plants). The cond method, presented by THORNTHWAITE and HOLZMAN, defines the total evaporation by measement of the specific humidity on two levels above soil surface and by determination of the coficient of turbulent exchange. The author prefers the second method but points out a mistake in e determination of the coefficient of turbulent exchange which exaggerates the value of evaporation om 200–300%. The author presents his own formula for determining the intensity of natural aporation through the coefficient of turbulent exchange. (*Same item as* 7.5-196, May 1956, *MAB.*) *ubject Headings:* **1. Evaporation measurement techniques.**—*N.T.Zikeev.*

10H–6 555.508:551.573:661.42

Bonython, C. Warren, **Instruments in the study of solar saltfields.** *Australian Journal of nstrument Technology*, 4(5):209–220, Sept. **1948.** 5 figs., 7 refs. **DBS**—The process of extracting lt from sea water at Dry Creek, S. Australia, is described. Problems of estimating evaporation om large sheets of brine are discussed. Instruments in use in the saltfield include raingages, wetd drybulb thermograph, anemographs and solarimeter. Instruments to measure evaporation by ethod of THORNTHWAITE and HOLZMAN are in process of installation. (*Same item as* 5J–10, Oct. 954, *MAB.*) *Subject Headings:* **1. Evaporation 2. Salt production 3. Australia.**

10H–7 551.573:551.579.5

Bac, Stanisław, **O transpiracji porostu łakowego i parowaniu nieporośnietych gleb, na podstawie dań w lizymetrach o rzeczywistych stanach wód gruntowych.** [Transpiration from meadow vegetion and evaporation from bare soil on the basis of investigations made with lysimeters accomoted to actual ground water conditions.] *Poland. Państwowy Institut Hydrologiczno-Meteorolozny, Wisdomości Służby*, 1(4):277–285, **1949.** 4 figs., 5 tables. **DWB**—Determinations of water nsumption by bare soil and meadow vegetation were carried out from 1939–1943 in four varieties soil (loess, peat, coarse sand and gravel) with lysimeters (1 m and 1.5 m deep) reaching the ground ater. Instruments were installed on a valley slope at the Experimental Station of Puławy. It has en found that under the climatic conditions of Puławy (51°25′N, 21°57′E; mean annual temperare 7.8°C; precipitation 607 mm) there is a noticeable deficiency of rainfall during the vegetative riod (April-Sept.) which is greater on overgrown areas and on higher situated places (with deeper vel of ground water). Bare soils require less precipitation and even accumulate moisture during e warm period. (*Same item as* 6.3—202, March 1955, *MAB.*) *Subject Headings:* **1. Evapotransration 2. Soil moisture 3. Precipitation deficiency 4. Puławy, Poland.**—*A.M.P.*

10H–8 551.573

Yamamoto, G. and Miura, A., **Evaporation by natural convection.** *Meteorological Society of pan, Journal*, 2nd Ser., 27(11):342–345, Nov. **1949.** 3 figs., 5 refs., 12 eqs. In Japanese: English mmary p. 37—A theoretical formula was developed for evaporation from a finite pan. For pan of dius 1.83 cm it gives 0.359 $(\theta_0 - \theta_\infty)\cdot^{25}$ $(C_0 - C_\infty)$ where θ_0; θ_∞, C_0C_∞ are temperatures and vapor ncentrations at water surface and in air. Experimental check gave constant as 0.296. (*Same item* 2.5–123, May 1951, *MAB.*) *Subject Heading:* **1. Evaporation.**—*C.E.P.B.*

1950

10H–9 551.573:63 551.508.71

Horney, Günther, **Verdunstungsmessungen am freiwachsenden Pflanzenbestand.** [Evaporaon measurements in a free-growing stand of plants.] *Meteorologische Rundschau*, 3(9–10):202–205, pt.-Oct. **1950.** 4 figs., 2 tables, 4 refs., eqs. **DWB**—Author observed the diurnal variation of diation, temperature, vapor pressure, saturation deficit and relative humidity in fields of lucerne, tatoes and maize, and calculated the heat economy and evaporation in mm/hr. Hourly values are ulated and graphed. A thermo-element psychrometer designed by ALBRECHT is described. *ame item as* 2.2–104, Feb. 1951, *MAB.*) *Subject Headings:* **1. Evaporation measurements 2. ronomy 3. Psychrometers.**—*C.E.P.B.*

10H–10 551.573

Ooi, S., **An experimental research of evaporation from a circular dish.** *Papers in Meteorology d Geophysics*, Tokyo, 1(1):133–147, Oct. **1950.** 13 figs., 8 tables, 11 refs.—A circular dish 1 cm ep, 10 cm diameter was placed in a wind tunnel edge level with a wooden plate. Wind speeds 7.4 m/s. Experimental data are given in full. An experimental formula of TRABERT's type, but re complex, is tabulated. The observations are also compared with YAMAMOTO's theoretical mula, with little agreement. A pan in a closed box was used to measure evaporation by diffusion.

(*Same item as* 2.8–103, August 1951, *MAB.*) *Subject Headings:* **1. Evaporation 2. Wind effects o evaporation.**—*C.E.P.B.*

10H–11 551.573:551.508.7(438

Schmuck, Adam, **W sprawie metod pomiarow parowania v Polsce.** [On the methods of meas urements of evaporation in Poland.] *Wrocławskie Towarzystwo Naukowe Sprawozdania*, Vol. 5 Suppl. 1, **1950.** 14 p. 5 figs., 10 tables, 7 refs. **DWB**—The need for uniform data is stressed an the network in Poland (a dozen or more stations) and the types of equipment and exposure are dis cussed. Observations and investigations made at Wrocław (Breslau) University in 1949 and 1950 ar outlined and the conclusion reached that the Wild evaporimeter should be used universally and in stalled at a standard height. Tables and graphs show comparative results of measurements mad with the Wild and Piche evaporimeters in different conditions. (*Same item as* 4.1–163, Jan. 1953 *MAB*). *Subject Headings:* **1. Evaporation measurements 2. Poland.**—*M.R.*

10H–12 551.508.72:551.57

Schofield, R. K. (*Great Britain*), **Infiltration (absorption by the soil), factors which determin the degree of infiltration of the rainfall, taking into account the effect of plants, the configuration o the soil, etc. and the importance of these influences.** *I.U.G.G. International Association of Scientifi Hydrology, Oslo, 1948*, [*Transactions*], 3:40–43, [**1950?**] fig., 6 refs. **DWB**—Report on some result of measurements made at Rothamsted with evaporation tanks (water surface, bare soil, grass cove different water levels). All surfaces respond in the same way to weather conditions. Using ferti lizers, it was found that transpiration is not closely related to rate of growth. Some remarks ar made on the computation of soil moisture deficit. (*Same item as* 10C–104, March 1959, *MAB.* *Subject Headings:* **1. Evaporimeters 2. Transpiration 3. Soil moisture 4. Rothamsted, Eng** —*A.A.*

1951

10H–13 551.501:551.57

Möller, Fritz, **Die Verdunstung als geophysikalisches Problem.** [Evaporation as a geophysica problem.] *Naturwissenschaftliche Rundschau*, 4(2):45–50, Feb. **1951.** 2 figs., 2 tables, 8 refs. **DW** —The only instrument giving representative measures of evaporation from land is the lysimete Author discusses alternative ways. The difference between rainfall-runoff gives regional values ov land. Over oceans radiation balance or surface salinity serve the same purpose. A third method investigation of the aerodynamical boundary layer. WUNDT developed a method by which evapora tion can be deduced from variation of humidity along a resultant air trajectory plus rainfall. Bu resultant wind is not representative; large scale austausch must be taken into account. This giv only a broad scale result but can be applied to the sea and to period of less than a year. (*Same item a* 2.7–132, July 1951, *MAB.*) *Subject Headings:* **1. Evaporation measurement techniques 2. Ocean** —*C.E.P.B.*

10H–14 551.573:551.508.7

Terada, Kazuhiko, **Note to the analysis of data of evaporation from rather large evaporation pa** *Oceanography and Meteorology*, Nagasaki, 5(1/2):13–15, June **1951.** 2 figs., 5 refs., 5 eqs. 1 Japanese; English summary p. 15. **DWB**—An expression for the rate of evaporation developed H G. YAMAMOTO is applied to experimental results obtained by C. ROHWER who used an evaporati pan 3 ft sq. It is found that a curve representing the rate of evaporation will closely follow t pattern of the theoretical curve of turbulent flow. (*Same item as* 4.8–165, Aug. 1953, *MAB.*) *Su ject Headings:* **1. Evaporation rate 2. Pan evaporimeters.**—*G.T.*

1952

10H–15 551.508.7:551.579.5(43

Bac, Stanislaw, **Influence de la manière de mesurer sur la détermination de la hauteur des pr cipitations atmosphériques.** [Influence of the method of measurement on the amount of the atm pheric precipitation.] *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951* [*Transaction* v. 3:33–43, **1952.** 5 tables, 2 figs. **DWB**—In connection with studies on the water balance of t soil, made by a battery of lysimeters in Puławy, the problem of precipitation measurement was i vestigated. Pluviometers with openings from 200–2500 cm² located at the earth's surface were co pared with the conventional Hellmann rain gage (1 m height). The measured precipitation w definitely dependent on the size of the opening, resulting in about 20% more for the 2500 cm² ar Using the data from the greater opening, reasonable water balance was computed, while the month percolation in lysimeters was often higher than the rainfall amount caught in the conventional ga (*Same item as* 6.4–65, April 1955, *MAB.*) *Subject Headings:* **1. Precipitation measurement Lysimeters 3. Hydrologic cycle 4. Puławy, Poland.**—*A.A.*

10H–16 551.508.72

Baumbach, S., **Vergleichsmessungen mit verschiedenen Verdunstungsmessern unter definierten Versuchsbedingungen.** [Comparative measurements with different evaporimeters under defined conditions.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte* No. 35:211–216, **1952.** 2 figs. **DWB**—Comparative measurements were made in a wind tunnel, at different wind speeds and radiation at 45°, of Robitzsch-Leistner (white), Piche (white, green, black, white with radiation shield) and Wild evaporimeters. The results differed greatly. A long discussion followed, in which W. HAUDE described experiments with clay pots in bare soil and different types of vegetation. (*Same item as* 4.1–57, Jan. 1953, *MAB.*) *Subject Headings:* **1. Evaporation instruments 2. Instrument comparisons.**—*C.E.P.B.*

10H–17 551.508.72

Boss, G , **Die Brauchbarkeit des Piche-Evaporimeters bei Verdunstungsmessungen.** [The use of the Piche evaporimeter in evaporation measurements.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte* No. 35:194–202, **1953.** 15 figs. **DWB**—Author describes measurements of diurnal variation of evaporation with modified Piche evaporimeters exposed in the open at various heights (2–160 cm) in S. W. Africa. These were compared with transpiration from desert plants with their roots in rubber balloons containing water. Agreement was good. He then describes 2 new recording evaporimeters—one photochemical, the other mechanical. (*Same item as* 4.1–58, Jan. 1953, *MAB.*)*Subject Heading:* **1. Evaporation instruments.**—*C.E.P.B.*

10H–18 551.508.72

Brown, Paul L. and Hallsted, A. L., **Comparison of evaporation data from standard Weather Bureau and Plant Industry type evaporation pans.** *Agronomy Journal*, Wash., D. C., 44(2):100–101, Feb. **1952.** table. **DA**—Fourteen years of contemporary observations showed a close relationship. The U. S. Weather Bureau pan is 4 ft in diameter and exposed, while the Bureau of Plant Industry pan is 6 ft in diameter and is set in the soil. The reduction equations are:

$$Y \text{ (Weather B.P.)} = 1.46X + .031 \text{ (in.)}$$
$$X \text{ (Plant I.P.)} = 0.667Y + .194 \text{ (in.)}$$

(*Same item as* 4.11–66, Nov. 1953, *MAB.*) *Subject Heading:* **1. Pan evaporimeters.**—*A.A.*

10H–19 551.551:551.573

Davies, D. R. and Walters, T. S., **Further experiments on evaporation for small, saturated, plane areas into a turbulent boundary layer.** *Physical Society of London, Proceedings, Ser. B*, 65(932): 640–645, Aug. 1, **1952.** 3 figs., table, 4 refs., 3 eqs. **DWB**—For abstract on paper describing the first investigation, *see* 3.5–227, May 1952, *MAB.* Experiments are now extended to lengths up to 5 in. and widths to 6 in. The setup is described and results tabulated and plotted. Evaporation is found to be proportional to (length)$^{0.76}$ and to (width)$^{0.84-.86}$, compared with a theoretical power (after O. G. SUTTON) of 0.88. The experimental values exceed those given by authors' 1951 formula by only 4%. (*Same item as* 4A-201, Jan. 1953, *MAB.*) *Subject Headings:* **1. Evaporation theory 2. Turbulence.**—*C.E.P.B.*

10H–20 551.508 72

Garnier, Benjamin John (*University College, Ibadan, Nigeria*), **A simple apparatus for measuring potential evapotranspiration** *Nature*, London, 170(4320):286–287, Aug. 16, 1952. **DWB**—Description of apparatus installed by the author in Seabrook, N. J. A known amount of water is applied to a tank covered by turf. Measuring the percolated water and knowing the precipitation amount, the potential evapotranspiration can be easily computed. (*Same item as* 4.11–67, Nov. 1953, *MAB.*) *Subject Headings:* **1 Evapotranspirometers 2. Potential evapotranspiration 3. Seabrook, N. J.**—*A.A.*

10H–21 551.501.7:551.573

Genève, R., **Méthode de mesure de l'évaporation à l'aide de radiosondages.** [Method of measurement of evaporation by means of radiosondes.] *Journal Scientifique de la Météorologie*, 4(15):110–121, July/Sept. **1952.** 3 figs., 3 refs. English and Spanish summaries p. 110. **DWB**—Simple method of measuring evaporation proposed, based on the comparison of two aerological soundings, located on the same trajectory. Example discussed with two ship stations over the North Atlantic being 1100 km apart. (*Same item as* 5.5–31, May 1954, *MAB.*) *Subject Headings:* **1. Evaporation measurement techniques 2. Radiosondes 3. North Atlantic.**—*A.A.*

10H—22 551.508.72

Glubshev, K. S., **Isparitelĭ s vodnoĭ poverkhnosti risovykh chekov.** [Evaporimeter for the water surface of rice paddies.] *Gidrotekhnika i Melioratsiia*, Moscow, No. 4: 70–73, **1952.** 2 figs.

DLC—Description of a simple portable evaporimeter, giving directly the height of evaporated water on a scale (1:25) which is connected with a float. Claimed accuracy 0.5 mm. (*Same item as* 5.9–62, Sept. 1954, *MAB.*)*Subject Headings:* **1. Evaporimeters 2. Rice paddies.**—*A.A.*

10H–23 551.573

Haude, Waldemar, **Verdunstungsmenge und Evaporationskraft eines Klimas.** [Evaporation amount and evaporation force of a climate.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:225–229, **1952.** 5 figs., 2 tables, 11 refs. **DWB**—Author discusses difficulties of determining amount of moisture carried away by the wind—comparison of 5-day means of evaporation from a free water surface with readings of Piche and saturation deficit, and annual variation of water loss from bare soil and various plants. He concludes that measured evaporation data can be supplemented by saturation deficit at 14 h, with a suitable local factor. (*Same item as* 4.7–140, July 1953, *MAB.*) *Subject Heading:* **1. Evaporation measurement.**—*C.E.P.B.*

10H–24 551.526.8:551.524.3 551.508.7

Hendricks, E. L. (*U. S. Geological Survey*) and Goodwin, Melvin H., Jr. (*U. S. Public Health, Newton, Ga.*), **Observations on surface-water temperatures in limesink ponds and evaporation pans in southwestern Georgia.** *Ecology*, 33(3):385–397, July **1952.** 9 figs., 4 tables, 3 refs. **DLC**—Studies of surface-water temperature in ponds and their relationship to the air temperature were undertaken in connection with studies of mosquito breeding places. Tables with average results of observations made in 1946 are given for three ponds and evaporation pans. The mean water temperature for a particular week is $Tw = a + bT_0 + cT_1$; T_0—air temperature for the same week; T_1—for the preceding week; *a*, *b*, *c*—constants. *b* increases and *c* decreases with decreasing dimensions of the water body. (*Same item as* 5.2–153, Feb. 1954, *MAB.*) *Subject Headings:* **1. Pond temperature 2. Pan evaporimeters.**—*A.A.*

10H–25 551.508.72 551.57

Leistner, Walter, **Ergebnisse vergleichender Verdunstungsbeobachtungen.** [Results of comparative evaporation observations.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte* No. 35:202–210, **1952.** 12 figs., 3 refs. **DWB**—Author compares evapotranspiration from potted tomato plants and evaporation by Leistner-Robitzsch spherical evaporimeter and discusses results taking account of sunshine, wind speed and relative humidity. In Pt. 2 he describes a new recording apparatus for the Leistner-Robitzsch evaporimeter and gives records comparing results with Wild-Lambrecht apparatus. (*Same item as* 4.1–59, Jan. 1953, *MAB.*) *Subject Headings:* **1. Evaporation instruments 2. Evaporation measurement techniques 3. Evapotranspiration.**—*C.E.P.B.*

10H–26 551.508.

Mihara, Y.; Yabuki, K. and Uchijima, Z. (*Nat. Inst. of Agri. Sciences, Tokyo*), **On the differential evaporation recorder.** *Journal of Agricultural Meteorology*, 7(3/4):137–139, Nov. **1952.** 3 figs. Japanese; English summary p. 139. **DWB**—The amount of evaporation in a large size evaporation pan is measured by reading the level of the water surface on a differential evaporation recorder with which the change in level, due to temperature variation, is eliminated. The instrument consists of two floats, a differential mechanism with a pair of pulleys and a string, and a tapping recorder. The instrument can record the amount of evaporation with an accuracy of 0.1 mm. An example of the records is shown in a photograph, from which calculated intensity of evaporation is illustrated with the diurnal variation of other weather factors. (*Same item as* 5.9–63, Sept. 1954, *MAB.*) *Subject Headings:* **1. Evaporation instruments 2. Evaporation measurement techniques.**—*From author abstract.*

10H–27 551.508.72:551.57

Natermann, Ernst, **Lysimeter und Wildsche Waage. (Ein Beitrag zur Auswertung der Eberswalde Verdunstungsversuche.)** [Lysimeter and Wild balance. (A contribution to the evaluation of the Eberswald evaporation investigation.)] *Wasserwirtschaft*, Sonderheft, pub. **1952.** p. 10– 5 figs., 3 refs. **DLC**—Lysimeter readings have only very local application, and the relation between monthly evaporation given by lysimeter (V_L) and by Wild balance (V_W) was examined. In meadows with ground water V_L/V_W varies from 0.43 (Dec.) to 1.89 (June), for meadows without ground water from 0.23 to 0.90. (*Same item as* 4.11–68, Nov. 1953, *MAB.*) *Subject Headings:* **Lysimetry 2. Evaporimeters.**—*C.E.P.B.*

10H–28 551.

Ostromęcki, Jerzy (*Bygoszez I.U.N.G. Dzial Gospodarski Wodnej*), **Evaporation from the surface of meadows on deep loams.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels, 1951* [*Transactions*], Vol. 3, pub. **1952.** p. 452–462. 8 figs., tab

gs. **DWB**—Technical reports on three years of experiments conducted with eight lysimeters with nstant ground water level from 40–130 cm beneath the surface. Formula adopted:

$$P_t = \frac{0.37}{0.2h} \Sigma d(1 + 0.25 \sqrt[3]{Q_z}).$$

$_t$—evapotranspiration for the period of vegetation of one swath (mm); Σd—total of daily mean turation on deficit (mb); h—ground water distance (m); Q_z—crop of green mass. Water requirement on peat twice as much as on loam. (*Same item as* 6.4–252, April 1955, *MAB.*) *Subject Headings:* **1. Evapotranspiration 2. Lysimeters.**—*A.A.*

10H–29 551.508.72

Renqvist, Henrik, **Evaporation recorder.** *I.U.G.G. Association of Scientific Hydrology, Brussels,* 951, [*Transactions*], Vol. 3, pub. **1952.** p. 473. diagr. **DWB**—Description with sketch of an utomatic recorder for evaporation from soil surfaces, continuously weighing a tank of 1 m³ capacity lled with earth. Oscillations due to wind drag are diminished by a damping system operating with l resistance. (*Same item as* 6.5–60, May 1955, *MAB.*) *Subject Heading:* **1. Evaporation recorders.** *-A.A.*

10H–30 551.573 551.579.5:551.508.72

*Schubach, K. (*Giessen, Germany*), **Wasserhaushaltsuntersuchungen an verschiedenen Bodenarn unter besonderer Berücksichtigung der Verdunstung.** [Investigations on the water economy of fferent soils with special regard to evaporation.] *Germany. Deutscher Wetterdienst in der USone, Berichte* No. 40, **1952.** 14 p. 5 figs., tables. **DWB**—Results of measurements with an imroved evaporimeter according to Popov are given (daily values of water content and evaporation om sand, humus and loess, and data for precipitation, temperature, wind velocity, relative humidity nd vapor pressure from April 1950 to March 1951). Annual evaporation—267 mm for sand (30% the precipitation) 321 mm (37%) for humus and 395 mm (45%) for loess. The relative distribuon of evaporation within the year is almost the same for all three soil types. (*Same item as* 4.6–50, June 1953, *MAB.*) *Subject Headings:* **1. Evaporation 2. Popov's evaporimeter.**—*A.A.*

10H–31 551.573:551.584:551.508

*Thornthwaite, Charles Warren (*comp.*), **Micrometeorology of the surface layer of the atmosnere.** Johns Hopkins University, Laboratory of Climatology, Seabrook, N. J., Contract W28-099-c-378, Interium Reports Nos. 1–18, **1948–1952.** figs., mostly tables, eqs. Index in **Final Report,** une 30, **1952.** **DWB**—One of the most important experimental contributions to the study of the teraction between soil and atmosphere, containing some 1600 pages of data and discussions. Curnt data include: maximum and minimum temperatures and daily precipitation for Seabrook and a etwork of some 50 stations on the Cape May Peninsula, potential evapotranspiration, soil moisture nd temperature, hourly precipitation, wind speed, total solar radiation and net radiation exchange, ut no current measurements of atmospheric humidity. Micrometeorological, simultaneous profiles emperature, humidity, soil temperature, wind) as well as smoke puff data are given for 107 single ays in short time intervals from 80 up to 640 cm height. Special attention was paid to the design of icrometeorological instruments (thermocouples, Thornthwaite's automatic and portable dew point dicator, anemometers, energy balance indicators, pyrheliometers, radiometers, evapotranspirometers, tensiometers, etc.). Careful calibration and error sources are discussed. A battery of 6 to 7 sic and a dozen modified evapotranspirometers were maintained in order to study potential evapoanspiration and the relation of soil moisture to the growth of plants. A series of some 20 articles is voted to theory of turbulence and its verification, turbulent transfer of heat and moisture, shear ress, evapotranspiration, and design of micrometeorological instruments. (*Same item as* 4B–326, b. 1953, *MAB.*) *Subject Headings:* **1. Micrometeorological data 2. Micrometeorological proes 3. Micrometeorological instruments 4. Evapotranspiration 5. Atmospheric turbulence 6. abrook N. J.**—*A.A.*

10H–32 551.573:551.581.1(766)

*†U. S. Navy Electronics Laboratory, San Diego, Calif., **Water-loss investigations, Vol. 1, Lake efner studies technical report.** *U. S. Geological Survey, Circular* 229, **1952.** 153 p. 29 tables, 98 s., refs., 108 eqs. Appendix: **Symbols and dimensions.** *U. S. Navy Electronics Laboratory, San iego, Calif., N E L Report,* 327, **1952.** **DWB**—Comprehensive attack on the problem of evaporan, sponsored by the Navy, the Geological Survey and the Weather Bureau of the U. S. Goal of the idy: the determination of evaporation by means of climatological data using mass-transfer and ergy-budget theories. Tests made using evaporation values computed from the water budget of e lake. Report contains the following papers: Harteck, G. Earl, Jr., **General description of Lake efner,** gives also climatic description, using data for Oklahoma City; Dennis, P. E., **Geology and**

ground water hydrology of the Lake Hefner Area, HARTECK, G. EARL JR., and KERMON, FRANK W. **The water-budget control,** computation of actual evaporation based on careful measurements of rain fall, inflow, outflow and change in reservoir contents, considering also evapotranspiration losses from the shore and thermal expansion of lake; ANDERSON, LLOYD Y., **Instrumentation for mass transfer and energy-budget studies,** recording measurements of air temperature, humidity and wind speed at 2, 4, 8 and 16 m above the lake surface, water surface temperature, wind direction and rainfall, as well as measurements of solar and terrestrial radiation and of solar radiation reflected from the water surface; MARCIANO, Y. Y. and HARTECK, G. EARL, JR., **Mass transfer studies,** valuable concise review on turbulent transfer of water vapor. A series of theoretical equations was tested. The best was SVERDRUP's formula, (1937) and almost as good was SUTTON's equation. THORNTHWAITE–HOLZMAN equation does not give good results, without proper instrumentation. All other tested evaporation equations were found to be unsatisfactory. For practical use the equation $E = 6.25 \cdot 10^{-4}\, U_8 (e_0$ $e_0)$ was used (usual symbols, index 8 for 8 m height). ERNEST, R., **Energy budget-studies,** one of the best papers ever published in this field. Indirect methods of evaluating solar radiation was tested against values measured at Lake Hefner and found to be inadequate for evaporation computations. Very detailed study devoted to theoretical and observed reflectivity (R_t) of short waves from the water surface. Empirical relationship proposed: $R_t = aS_A{}^b$; S_A altitute of sun; $a = 1.18$, $b = -0.7$ for clear sky, variable for cloudy sky. Other studies and tests were made for effective back radiation (clear and cloudy sky), radiation for the body of water, reflected long wave radiation, advected energy, the Bowen ratio, convective heat, evaporation energy, etc. HARTECK, G. EARL, JR., **Cummings radiation integrator.** The late N. W. CUMMINGS suggested using a water pan, thermally insulated by rock wool and perlite concrete, to measure the integrated energy balance. Test results satisfactory. KOHLER, MAX A., **Lake and pan evaporation,** presents a comprehensive literature summary of monthly and annual pan-to-lake reduction coefficients. Theoretical water-temperature and energy-balance approach for this coefficient outlined and numerous results, obtained during the Lake Hefner experiment, given. (*Same item as* 5.3–13, March 1954, *MAB.*) *Subject Headings:* **Evaporation 2. Turbulent transfer of moisture 3. Heat balance of lakes 4. Evaporation pan 5. Symposia 6. Lake Hefner, Okla. I. U. S. Weather Bureau II. U. S. Geological Survey.**—*A.A.*

10H–33 551.579.5:551.525

Yabuki, K., **On the temperature of the ground and water in the percolating paddy field, Pt.** *Journal of Agricultural Meteorology*, Tokyo, 7(1) 13–14, Dec. **1951.** 7 figs. In **Pt. 2,** *Ibid.*, 7(3/4) 145–148, Nov. **1952.** Both in Japanese; English summaries p. 14 + 148. **DWB**—Measurements of percolation made with a lysimeter of new design are reported. Pt. 1 of the report includes description and illustration of the instrument and determination of thermal diffusibility and of amplitude of diurnal ground temperature variation as functions of degree of percolation. Pt. 2 gives an account of vertical and horizontal distribution of water temperature in a paddy field with continuous cold and warm water supply, as obtained both in the open field and under laboratory conditions. (*Same item as* 4.11–237, Nov. 1953, *MAB.*) *Subject Headings:* **1. Percolation 2. Soil temperatures 3. Agricultural meteorology 4. Lysimeters.**—*G.T.*

1953

10H–34 551.573:551.508

†Berger-Landerfeldt, U., **Beiträge zur Messung der Evapotranspiration nach dem Austauschverfahren.** [Contribution to the measurement of evapotranspiration by the exchange method.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 5(1):66–102, **1953.** 6 figs., 66 refs., 37 eqs. German, English and French summaries p. 66–67. **DWB**—This paper discusses in detail methods of measuring transpiration by weighing, and evapotranspiration (by exchange method). Among problems considered are instrument height above plant tops, effective zero level, nonadiabatic gradients and advection. Author then describes his own set-up and measurements over lucerne in Berlin-Charlottenburg and shows results in curves of variation 9–18 h on various days in summer and autumn 1951. Great differences between results of the two methods are attributed to turbulence. (*Same item as* 5.3–238, March 1954, *MAB.*) *Subject Headings:* **1. Atmometry 2. Evapotranspiration.**—*C.E.P.B.*

10H–35 551.501:551.526 551.5

Hammecke, K. and Kappler, E. (*Physik. Inst., Müster Univ.*), **Eine neue Methode zur Bestimmung der Oberflächentemperatur des Wassers bei Verdampfungsversuchen.** [A new method of measuring water surface temperature during evaporation experiments.] *Zeitschrift für Geophysik* Sonderband, pub. **1953.** p. 181–185. 4 figs., eqs., 3 refs. **DWB**—A thin border layer with a sharp temperature gradient exists within the water at the surface during evaporation, so that the actual surface temperature cannot be measured even by a thermometer. The author developed a device

hereby the temperature is measured pyrometrically with an accuracy of 0.05°C by the radiation om the surface. The computation of the true surface temperature from the measured value, which representative for a layer of about 0.01 mm, is explained. A sketch of the equipment is shown and e determination of the condensation coefficient discussed. (*Same item as* 5.8–24, Aug. 1954, *MAB.*) *ubject Headings:* **1. Water surface temperature measurement 2. Evaporation 3. Laboratory xperiments.**—*A.A.*

10H–36 551.508.72

Uhlig, Siegfried, **The Popoff evaporimeter.** *Weather*, 8(1):9–10, Jan. **1953.** fig., 3 refs. **DWB**—escription of an instrument in use in Germany for measuring evaporation from bare soil as difference etween total loss of water and percolation water. Amounts are found by weighing removable olumns of soil. (*Same item as* 5.9–65, Sept. 1954, *MAB.*) *Subject Headings:* **1. Popov's evaporim-er.**—*C.E.P.B.*

1954

10H–37 551.508.72

De Pasqualle, Oreste, **Un necessario perfezionamento agli evaporigrafi tipo Wild.** [A necessary nprovement for the Wild atmometer.] *Rivista di Meteorologia Aeronautica*, 14(1):42–44, Jan./ larch **1954.** 2 figs., 3 refs. Italian, French, English and German summaries p. 42. **DWB**—The uthor describes with the aid of diagrams a simple model of a damper capable of eliminating the re-ording irregularities of the Wild atmograph caused by wind and turbulence. *Subject Heading:* **1. Vild evaporimeter.**—*I.L.D.*

10H—38 551.508.72

*Federov, S. F., **Opyt ekspluatatsii gidravlicheskogo pochvennogo isparitelia maloĭ modeli GPI-51**). [Experiment on the use of the small model hydraulic soil evaporimeter, GPI–51 type.] *eningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):121–141, **1954.** 5 figs., 9 + 5 ables, 3 refs. **DLC** (GB651.L38)—Results of observations of evaporation carried out at VNIGL Valdai Hydrological Observatory) from 1951–1953, as well as the design of the implement, are pre-nted and discussed. The author also draws some conclusions on the efficiency of the evaporimeter n the basis of his own observations and of data obtained at Kamennaia Steppe and Dubovka Hydro-eteorological Observatories in 1952, and presents an evaluation of the work of the evaporimeter. has been found that, in view of the accuracy of its measurements, it would be expedient to introduce in the network of specialized stations and research institutions studying evaporation from the soil. *Same item as* 9.6–114, June 1958, *MAB.*) *Subject Headings:* **1. Soil evaporimeters 2. Evaporation om soil.**—*A.M.P.*

10H–39 551.508.72:551.48

*Fedorova, T. G. and Konstantinov, A. R., **Opyt ekspluatatsii plovucheĭ isparitel'noĭ ustanovki.** Experiment on the use of floating evaporimeter installations.] *Leningrad. Gosudarstvennyĭ Gid-logicheskiĭ Institut, Trudy*, 45(99): 182–195, **1954.** 4 figs., 11 tables, 9 refs. **DLC** (GB651.L37)—he paper contains a description of the raft, and of the best distribution on it of equipment and instru-ents. On the basis of an analysis of the performance of evaporimeters, the authors demonstrate e full conformity of evaporation values measured by means of the evaporimeters installed on the ft, with evaporation values of Valdai Lake. As a result of comparison of the measured evaporation lues from the water surface with values computed by various methods, the authors present their ggestions concerning the suitability and the shortcomings of these methods. (*Same item as* 9.6–5, June 1958, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Evaporation from water surfaces.** *A.M.P.*

10H–40 551.573:551.551(435.15)

Frankenberger, Ernst, **Messungen der natürlichen Verdunstung über Gras nach verschiedenen ethoden und einige Folgerungen betreffend atmosphärische Turbulenz und Konvektion.** [Meas-ements of natural evaporation over grass by different methods and some conclusions concerning mospheric turbulence and convection.] *Annalen der Meteorologie*, 6(1/2):5–13, **1953/54.** 8 figs., tables, 12 refs., 10 eqs. German and English summaries p. 5. **DWB, DLC**—Measurements of aporation at Quickborn with the small Popov lysimeter and with a special fine-scale apparatus are mpared with values calculated by heat economy and austausch methods. The nature of convection examined; the observed temperature gradients in the lowest 20 m are so far below those required Benard cells that these cannot be accepted. Fine-scale records of vertical velocity at 10 m agree sly well with those given by HESSELBERG's formula and by calculation from heat transfer, but ow little relation to prevailing wind speed. (*Same item as* 5.8–182, Aug. 1954, *MAB.*) *Subject adings:* **1. Evaporation measurement techniques 2. Wind structure 3. Hamburg, Germany.** *C.E.P.B.*

10H–41 551.573(669

*Garnier, B. J., **Measuring potential evapotranspiration in Nigeria.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(1):140–176, **1954.** 4 figs., 3 tables. **DWB**—A simplified evapotranspirometer, watered from above, was found superior to a tank with constant water level. Daily values of computed and measured potential evapotranspiration, precipitation and temperature are communicated for 5 places in Nigeria, as well as wet and dry bulb temperatures and sunshine for University College at Ibadan. Evapotranspiration measurements were started in June 1951. The results show a fair agreement with Thornthwaite's formula, and an excellent correlation with saturation deficit. (*Same item as* 6.3–220, March 1955, *MAB.*) *Subject Headings:* **1. Potential evapotranspiration 2. Evapotranspiration data 3. Thornthwaite's method 4. Ibadan Nigeria 5. Nigeria.**—*A.A.*

10H–42 551.501:551.57

*Haude, Waldemar, **Zur praktischen Bestimmung der aktuellen und potentiellen Evaporation und Evapotranspiration.** [Practical determination of actual and potential evaporation and evapotranspiration.] *Germany. Deutscher Wetterdienst, Mitteilungen*, No. 8, May **1954.** 22 p. 7 figs. 10 tables, 12 refs. **DWB**—Comparison of evaporation from an open pan and a Piche evaporimeter under similar conditions showed a close agreement in monthly totals of magnitude of evaporation. The annual variation of evaporation from a shielded pan and of the saturation deficit at 1400 hr are analogous. Further comparisons were made between evaporation from moist soil, from actual plowland and from grass covered soil. Studies were carried out on the effect of air movement upon evaporation, on actual evapotranspiration and on the relationship between water need and irrigation. The significance of the 1400 hr deficit value as determined by evaporation rate for cultivated land and the measurement of actual evaporation from plowland with Popov apparatus are discussed. (*Same item as* 6.1–232, Jan. 1955, *MAB.*) *Subject Headings:* **1. Evaporation measurement comparisons Pan evaporimeters 3. Piche evaporimeter 4. Evapotranspiration.**—*I.L.D.*

10H–43 551.573:63 581.116 551.508.79:631.6

Hesse, W., **Ergebnisse von Pflanzentranspirationsmessungen mit Kleinlysimetern im Zusammenhang mit meteorologischen Einflüssen.** [Results of plant transpiration measurements with small lysimeters in relation to meteorological influences.] *Angewandte Meteorologie*, 2(3):65–8 Nov. **1954.** 20 figs., 6 tables, 8 refs. **DLC**—The Hesse small lysimeter and its use are illustrated. Frequent transpiration measurements in various crops near Leipzig in 1950 growing season with and without fertilizers are described and shown in graphs with associated temperature, humidity, evaporation, light intensity, cloud, precipitation and wind speed at 0.5 and 2 m. These show clearly the influence of weather on transpiration and plant physiology. The data enable the optimum water need of different plant varieties to be determined for different fertilizers and soils, thereby economizing water. (*Same item as* 6.5–206, May 1955, *MAB.*) *Subject Headings:* **1. Transpiration 2. Transpiration recorders.**—*C.E.P.B.*

10H–44 551.508.

Kawano, Y., **Self-recording-evaporimeter with temperature compensator.** *Journal of Meteorological Research*, Tokyo, 6(6):207–208, July **1954.** 2 figs., eqs. In Japanese; English summary 207. **DWB**—The author found the necessary condition to be satisfied to avoid the lateral displacement of float in evaporimeter due to the change of water temperature. The relation is: $V = sL$, which V the volume of float dipped in the water, s the sectional area of the float crossed at the water level and L the water depth of evaporimeter. The errors coming from the small difference from the above relation are very small, the water temperature changing within 20°C a day. (*Same item as* 9.1–138, Jan. 1958, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Recording instruments**—*Author's abstract.*

10H–45 551.508.72:551.

*†Konstantinov, A. R. and Struzer, L. R., **Izmerenie summarnogo ispareniia i transpiratsii sel'skokhoziaĭstvennykh kul'tur s pomoschch'iu isparitelei.** [Measurement of total evaporation and transpiration from crops by means of evaporimeters.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):66–94, **1954.** 5 figs., 24 tables, 27 refs. **DLC** (GB651.L38)—The authors discuss the results of experimentation in the use of evaporimeters for measuring evaporation from crops, and describe methods enabling one to determine separately the transpiration of plants and the evaporation from the soil. For the zone of deficient moisture, systematic comparison of evaporation values measured with evaporimeters is presented, and evaporation obtained by the method of water balance in the soil layer of active moisture exchange. (*Same item as* 9.3–157, March 1958, *MAB.*) *Subject Headings:* **1. Evaporation measurement techniques 2. Evaporimeters 3. Transpiration**—*A.M.P.*

10H–46 551.501:551.508.72:551.573

*†Konstantinov, A. R., **Sopostavlenie razlichnykh metodov opredeleniia isparenia.** [Comparison of different methods of determining evaporation.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):95–120, **1954.** 5 figs., 13 tables, 19 refs. **DLC** (GB651.L38)—Results obtained with the aid of evaporimeters (gravimetric and hydraulic) are compared with results of evaporation determinations obtained by other methods such as the water balance of active moisture exchange in soil layers, the heat balance of the soil's surface, and the diffusion method. At the end of the paper, the author discusses the comparitive merits of various methods of determining evaporation from the soil. (*Same item as* 9.3–142, March 1958, *MAB.*) *Subject Headings:* **1. Evaporation measurement comparisons 2. Evaporimeters 3. Evaporation measurement techniques.**—*A.M.P.*

10H–47 551.508.72

*Kuznetsov, V. I., **Issledovanie o vliianii teplovoĭ izoliatsii na pokazaniia vodnykh isparitelei.** [Investigation on the effect of thermal insulation on the readings of hydraulic evaporimeters.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):174–181, **1954.** 2 figs., 5 tables, 3 refs. **DLC** (GB651.L38)—In order to avoid the necessity of introducing transition coefficients in the reading of evaporimeters, it would be expedient to construct an evaporimeter with a 3000 cm^2 surface, whose indications would be much the same as the reading of hydraulic evaporation pans. In this paper the author claims, on grounds of an analysis of observations made at 4 runoff (discharge) stations (Valdai, Dubovka, Nizhne-Devitsk, Iaskhan) in 1952–1953, that in zones of sufficient and excessive moistening, one could use the ground evaporimeters GGI-3000 instead of evaporimeter pans with 20 m^2 surface, thermal insulation, and slanted deflector. (*Same item as* 9.10–131, Oct. 1958, *MAB.*) *Subject Headings:* **1. Transition coefficient of evaporimeters 2. Evaporimeters.**—*A.M.P.*

10H–48 551.508.72:551.573:551.48

*Kuznetsov, V. I., **O perekhodnykh koeffitsientakh nazemnykh isparitelei GGI-3000.** [On the transition coefficients of the ground evaporimeter GGI-3000.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):142–156, **1954**: 5 figs., 6 tables, 11 refs., 9 eqs. **DLC** (GB651.L38)—A method of conversion of readings of the ground evaporimeter GGI-3000 to the evaporation from a 20 sq m evaporation pan is introduced and explained. In using this method, the author constructs a scheme of isolines of the transition coefficient from evaporimeter readings to values of a pan for the European, and a part of the Asiatic, territory of the U.S.S.R. The scheme enables one to use data of network observations made by ground evaporimeters GGI-3000 for evaluating evaporation from the water surface of kolkhoz ponds and small natural water reservoirs. (*Same item as* 9.10–132, Oct. 1958, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Transition coefficient of evaporimeters 3. Evaporation from water surfaces.**—*A.M.P.*

10H–49 551.573:533.15:533.6

Owen, P. R. and Ormerod, A. O., **Evaporation from the surface of a body in an airstream (with particular reference to the chemical method of indicating boundary-layer transition).** *Great Britain, Aeronautical Research Council, Reports and Memoranda*, No. 2875(14,604), **1954.** 42 p. 17 figs., 8 tables, 28 refs., eqs. **DLC**—A method is described of predicting the rate of sublimation of a substance on a flat plate in turbulent or laminar flow by determining the transport of a foreign gas through a boundary layer, given the concentrations at the surface and in the main stream. The "concentration" of the gas is given by expressions involving a measurable coefficient which has been determined for some liquids (including water) and solids. It is shown that the effects of molecular diffusion in the laminar sub-layer may be important. A calculated example confirms that the rate of sublimation of a substance from the surface of an aircraft decreases very rapidly with increasing height. (*Same item as* 6.4–254, April 1955, *MAB.*) *Subject Headings:* **1. Aerodynamic theory 2. Evaporation theory.**—*C.E.P.B.*

10H–50 551.508.72:551.573.551:579

*Pushkarev, V. F., **Issledovanie metodov nabliudeniĭ nad ispareniem s pochvy.** [Investigations on the methods for observing soil evaporation.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99):5–66, **1954.** 41 figs., 40 tables, 22 refs. **DLC** (GB651.L38)—In this paper the author 1) presents a critical analysis of results of the use of soil evaporimeters in the past; 2) describes the operation of a large size (5 sq m by 2 m height) hydraulic evaporimeter at Valadi Scientific-Research Hydrological Laboratory (VNIGL hydraulic evaporimeter); 3) compares the values of evaporation measured by means of evaporimeters of different design and size; 4) discusses the heat and water regime of soil evaporimeters; 5) presents data on infiltration of precipitation in the underlying soil layers, and 6) evaluates the influence of ground waters on the magnitude of evaporation from the surface of the soil. (*Same item as* 9.3–159, March 1958, *MAB.*) *Subject Headings:* **1. Soil evaporimeters 2. Evaporation from soil.**—*A.M.P.*

10H–51 551.508.72:581.116

Raschke, K., **Ein Verfahren der Transpirationsbestimmung an Blattpunkten, Blatteilen und ganzen Blättern in situ.** [An experiment in determining transpiration at leaf points, parts of leaves and whole leaves *in situ.*] *Naturwissenschaften*, 41 (13):308, July 1, **1954.** fig., 3 refs. **DWB**—The leaf to be measured is placed alongside a similar one with a waterproof coating. Thermoelements measure temperature difference θ and θ' between each leaf and surrounding air, and radiation S, S' is measured by new microrecorders. Transpiration rate is given by $(S - S'\theta/\theta')/V(t)$, where $V(t)$ is the evaporation enthalpy. The transpiration topography of a leaf of *Canna indica* is shown. Transpiration of the whole leaf is obtained by integration. (*Same item as* 5.10–62, Oct. 1954, *MAB.*) *Subject Heading:* **1. Transpiration meters.**—*C.E.P.B.*

10H–52 551.508.72 551.573

Robertson, George W. (*Dept. of Transport, Canada*), **Latent evaporation: its concept, measurement and application.** Experimental Farms Service, Dept. of Agriculture, Ottawa, Ontario, Canada. Original paper presented Jan. 29, **1954,** at the regularly weekly seminar of the Field Husbandry, Soils & Agricultural Engineering Div. 14 p. 6 figs., 18 refs., 7 tables, 2 eqs. The author defines latent evaporation as the maximum drying ability of the air measured by a black, plain horizontal surface fully exposed to all existing meteorological factors. A careful test with a series of conventional evaporimeters revealed that the black Bellani plate (diameter 7.5 cm, height above ground 4′), invented over 130 years ago, gives the highest correlation (R) with meteorological factors controlling evaporation: wind speed R = 0.27, temperature 0.46, vapor pressure deficit 0.72, solar energy 0.77. The corresponding values for a 4′ tank at the level of the soil surface were 0.23, 0.30, 0.46 and 0.60. The Bellani plate evaporated 2.4 times more than the 4′ tank from a unit surface. A rough method is explained how to relate the Bellani values to evapotranspiration from vegetation. A bookkeeping procedure shows the current soil moisture reserve. (*Same item as* 6.4–72, April 1955, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Evaporation measurement techniques 3. Bellani evaporimeter 4. Evapotranspiration 5. Ottawa, Canada.**—*A.A.*

10H–53 551.577:551.579.1:631.4(764)

*Smith, R. M.; Henderson, R. C. and Tippit, O. J. (*all, Blackland Experiment Station, Temple Tex.*), **Summary of soil and water conservation research from the Blackland Experiment Station, Temple, Texas, 1942–1953.** *Texas. Agricultural Experiment Station, Bulletin*, No. 781, June **1954.** 54 p. 52 figs., 18 tables, 33 refs. **DWB** (631.45 S657s)—Annual precipitation 1913–53 from Blackland Experiment Station, Temple, Tex., is shown in a series of histograms; average (1942–51) rainfall vs. erosion, soil losses and runoff, and storm hydrographs for a 2.0″ rainfall in May 12, 1953 showing relation to soil moisture and crop conditions, slopes; and for an additional storm rainfall of 1.66″ immediately following the 2.0″ storm are also shown (on curves). All data are given in appendix. Details of lysimeter design and operation and other crop-runoff-erosion studies are presented. (*Same item as* 9.8–222, Aug. 1958, *MAB.*) *Subject Headings:* **1. Soil conservation research 2. Rainfall-runoff relationship 3. Lysimeters 4. Temple, Texas.**—*M.R.*

10H–54 551.508.7

*Uryvaev, P. A., **Vliianie na pokazaniia vodnykh ispariteleĭ ikh razmerov i gruntov, v kotorykh oni ustanovleny.** [Influence of the size of evaporimeters, and the ground in which they are installed on the readings.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45 (99):157–172, **1954.** 5 figs., 12 tables, 5 refs. **DLC** (GB651.L38)—On the basis of investigations carried out in summer 1951 at the Valday Hydrologic Laboratory, the author concludes that it is possible to install evaporimeters in any type of turf covered ground. Further, he establishes that measured evaporation amounts decrease regularly with the increase of the area of evaporating surface. This decrease continues up to a determined size of evaporimeters which is different for different physico-geographical regions. The influence of the depth of evaporimeters is substantially noticeable only in the fall period. (*Same item as* 10.3–140, March 1959, *MAB.*) *Subject Heading:* **1. Evaporimeters.**—*A.M.F.*

10H—55 551.508.7

Vilkner, Hans, **Ein Gelände-Verdunstungsmesser.** [Soil-evaporation measuring instrument.] *Zeitschrift für Meteorologie*, 8 (7/8):247–251, July/Aug. **1954.** 3 figs., table, 6 refs. German summary p. 247. **DWB**—An evaporimeter based upon the Piche principle is described. This evaporimeter possesses a temperature equalizing tube, which enables the surface of the evaporating body to be evenly moist in spite of rainfall and warming up, and prevents the dripping of water during frequent alteration of sunshine and shade. The special characteristics of this evaporimeter are its light weight, small size and easy transportability. Accordingly, these properties make this instrument especially suitable for use in the country during the growing season. It is constructed so as to use also rainfall water for evaporation. (*Same item as* 9.1–104, Jan. 1958, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Evaporation measurement techniques.**—*Based on author's abstract.*

1955

10H–56 551.508:581.116 551.508.71

Andersson, Nils Elvir and Hertz, Carl Hellmuth (*both, Fysiska Inst., Lund, Sweden*), **Positive Spitzenentladung als Hygrometer geringer Trägheit.** [Positive point discharges as a hygrometer of small lag.] *Zeitschrift für angewandte Physik*, Berlin, 7(8):361–366, Aug. **1955.** 5 figs., 18 refs. **DLC**—An electrical discharge hygrometer, to be used for accurate and rapid measurements of transpiration from plant leaves into the surrounding air, is described in theory and in detail as to the construction, calibration, properties of the hygrometer and applications. Continuous records, made for half an hour to one hour of transpiration from leaves of tomato and *Thunbergia alata*, show the sudden variations occurring when a leaf which has been illuminated for a long period is suddenly cut at its base (sharp rise followed by an even more marked drop in relative humidity of air which issues from orifice of sensitive instrument and variations which occur during normal illumination, respectively). (*Same item as* 7.5–82, May 1956, *MAB.*) *Subject Headings:* **1. Transpiration meters 2. Electric hygrometers 3. Corona discharge hygrometer 4. Plant transpiration measurement techniques.**—*M.R.*

10H–57 551.579.5(438)

Bac, Stanisław and Marcilonek, Stanisław, **La condensation de la vapeur d'eau dans le sable et dans le gravier en vue des conditions climatiques en Pologne.** [Condensation of water vapor in sand and in gravel in climatic conditions of Poland.] *Acta Geophysica Polonia*, Warsaw, 3(4):176–194, **1955.** 7 figs., 6 tables, 7 refs. Polish summary p. 193–194. **DWB, DLC**—A very detailed report on the methods, procedures, and results of a study of the water balance in sands of different coarseness and gravel carried out with a series of lysimeters at the State Agronomic Research Station at Puławy. Long period (1926–1939 and 1941–43) observations have shown that in conditions of the Polish climate, and especially in the summer period, a replenishment of the water reserves takes place in sandy soils by infiltration of rain and snow water. (*Same item as* 10.3–304, March 1958, *MAB.*) *Subject Headings:* **1. Water balance in sand 2. Lysimeters 3. Poland.**—*A.M.P.*

10H–58 551.501:551.573(492)

*Deij, L. J. L.; Hooghoudt, S. B.; Latour, J. H. M.; Pearlkamp, P. K. and Stam, A. H., **Het verdampingsonderzoek in de Rottegatspolder, gedurende de jaren 1947 tot en met 1952.** [Evaporation research in the Rottegatspolder, 1947–1952.] (In: Nederlandse Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, **Verslagen technische bijeenkomsten 7–10 en Verslag inzake het verdampingsonderzoek in de Rottegatspolder 1947–1952.** pub. The Hague, **1955.** p. 209–254. 9 figs., 9 tables, 4 refs., 18 eqs. English summary p. 275–276; French summary p. 298–299.) **DWB**—This comprehensive report includes the following: a detailed description of various procedures for investigating evaporation from the polder, mainly the method of vertical water vapor transport; the method of water balance for an entire polder and the method of water balance for four drainage lysimeters. The procedures and the equations relevant to each method, and measured and calculated data on evaporation are presented. The results of the four methods are evaluated. (*Same item as* 9.3–209, March 1958, *MAB.*) *Subject Headings:* **1. Evaporation measurement techniques 2. Evaporation research 3. Netherlands.**—*I.L.D.*

10H–59 551.508.72:551.579.5

Friedrich, W., **Lysimetermessungen und andere gewässerkundliche Verfahren zur Ermittlung der Grundwassererneuerung.** [Lysimeter measurement and other hydrological methods for determining ground water supply.] *Deutsche Geologische Gesellschaft, Stuttgart, Zeitschrift*, 106(1):41–48, Dec. **1955.** 4 figs., 4 refs. **DLC, DGS**—Basic principles of lysimeter measurement for determining amounts of ground water storage and runoff and effects of plant cover, are discussed with particular attention to preliminary results of measurements made at Dortmund, Germany (1952–53) and Castricum, Netherlands (1942–47 and 1950–51). In Germany there is a tendency to forego large and expensive weighing lysimeters and install larger numbers of smaller (non-weighing) units in a variety of soils and plant cover. (*Same item as* 10C–33, March 1959, *MAB.*) *Subject Headings.* **1. Lysimetry 2. Dortmund, Germany 3. Castricum, Netherlands.**—*G.T.*

10H–60 551.501.9:551.508.72:551.573(431.5)

*Germany. Deutscher Wetterdienst, **Bericht über Messungen mit dem Piche-Evaporimeter in einem Sondernetz von 20 Stationen.** [Report on measurements with the Piche evaporimeter in a special network of 20 stations.] Bad Kissingen, Jan. **1955.** 38 p. tables. **DWB**—Evaporation data for 20 stations in West Germany are tabulated by station for each month from July–Oct. 1954, and for all stations comparatively by 5-day periods. The Piche-evaporimeter is considered practicable for daily use in spite of faults which are fully discussed. Effect of rain, hail, temperature, sunshine, etc. are considered and best means of obtaining accurate results recommended. (*Same*

item as 7.8–74, Aug. 1956, *MAB.*) *Subject Headings:* **1. Evaporation networks 2. Evaporation data 3. Piche evaporimeter 4. West Germany.**—*M.R.*

10H–61 551.508.72 551.573:551.524

Glazova, E. F. and Laĭkhtman, D. L., **Elementarnaia teoriia uvlazhnennogo isparitelia i ego primenenie dlia izucheniia tubulentnosti.** [Elementary theory of moist evaporimeter and its use in the study of turbulence.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 3:278–281, **1955.** fig., 5 tables, ref., 6 eqs. **DLC**—The method involves the use of a constantly moist evaporimeter which is described with the aid of a diagram. The results of measured and calculated evaporation, and the measured and calculated hourly values of the coefficient of temperature for Pakhta-Arala and Koltush are compared. (*Same item as* 7.2–92, Feb. 1956, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Evaporation measurements 3. Temperature effects on evaporation.**—*I.L.D.*

10H—62 551.508.72:551.579.4

Gur'ev. A. I., **Gidravlicheskiĭ printsip uvelicheniia masshtaba zapisi urovneĭ vody.** [Hydraulic principle to increase the scale of registration of water levels.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:49–51, July/Aug. **1955.** fig., 9 eqs. **DWB**—The author describes an apparatus for measuring evaporation from open reservoirs—namely a floating evaporimeter, the principle of which can be used to determine the variation of water level at a given point or variations in the difference of the levels without the interruption of cumbersome mechanical devices. The apparatus is described with the aid of a diagram; its physical principles are analyzed mathematically; and the results of experimental tests are presented. (*Same item as* 7.5–89, May 1956, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Water level variations.**—*I.L.D.*

10H–63 551.508.72:581.11

†Halkias, N. A.; Veihmeyer, F. J. and Hendrickson, A. H., **Determining water needs for crops from climatic data.** *Hilgardia*, Berkeley, Calif., 24(9):207–233, Dec. **1955.** 13 figs., 7 tables, 47 refs. **DWB**—Examination of data on evaporation and related phenomena obtained at various stations in California at various times between 1930 and 1950, and a review of literature on evaporation measurement methods and the determination of transpiration lead to the conclusions that the inexpensive white spherical Livingstone atmometer yields values sufficiently close to evaporation from a free water surface; that the difference in evaporation between black and white atmometers is a good indicator of (a) the use of water by crops and (b) solar radiation as measured by an Eppley pyrheliometer. Thus the use of water by plants may be calculated from data obtained with black and white atmometers or, if such are not available, from incident energy measured with the Eppley pyrheliometer. (*Same item as* 8.11–88, Nov. 1957, *MAB.*) *Subject Headings:* **1. Evapotranspirometers 2. Livingstone atmometer 3. California.**—*G.T.*

10H–64 551.5:63:06(43

Kreutz, W., **Tätigkeitsberichte der Agrarmeteorologischen Dienststellen, Giessen.** [Activity report of the Agro-Meteorological Office at Giessen.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(4):40–65, **1955.** 25 figs., tables. **DWB**—During 1954, the agrometeorological station carried out studies on soil climate, particularly the water balance of the soil, by measuring evaporation of soil moisture of various types of soil, development of improvements of the Popov evaporimeter, of comparative evaporation measurement with the Piche evaporimeter and the Wild balance, on the influence of different types of wind protection of plantings upon local climate, phenological and growth characteristics of wind protected plantings, and it maintained current observations on soil temperature and soil moisture and on barn and greenhouse climates. In addition, numerous rural climatic studies were carried out for the purpose of estimating the value of farming land; examples of these studies are described. The work plan for 1955 is outlined. (*Same item as* 8.4–73, April 1957, *MAB.*) *Subject Headings:* **1. Agrometeorological services 2. Hydrologic cycle 3. Evaporimeters 4. Soil moisture 5. Giessen, Germany.**—*I.L.D.*

10H–65 551.573:551.508.72(438

Michalik, Janina, **Porównanie pomiarów parowania ewaporymetrami Piche' na wolnym powietrzu i w klatce.** [Comparison of evaporation measurements using the Piche evaporimeter in free air and in an instrument shelter.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby*, 5(1):43–47, **1955.** 4 figs., table, 8 refs., eqs. Russian and French summaries p. 4 **DLC**—The results of observations and calculations at the meteorological station of Bydgoszcz during 1951–1954 show that evaporation in free air is 1.5 greater than evaporation in an instrument shelter; there is a good correlation between evaporation and saturation deficit, which amounts to +0.988. During summer, E. winds cause a greater saturation deficit and evaporation than W. winds. (*Same item as* 8.7–257, July 1957, *MAB.*) *Subject Headings:* **1. Evaporation measurement comparisons 2. Piche evaporimeter 3. Bydgoszcz, Poland.**—*A.M.P.*

10H–66 551.508.72:551.573(540)

*Parthasarathy, K. and Misra, R. K. (*both, Met. Office, New Delhi*), **Comparison of pan and Piche evaporimeters.** *Indian Journal of Meteorology and Geophysics*, Delhi, 6(2):197–201, April **1955.** 3 tables, 3 refs. **DWB, DLC**—Daily observations of Piche and pan evaporimeters were made at Jodhpur, New Delhi, Lucknow and Allabahad in order to evaluate the conversion of Piche evaporation to evaporation from free water surfaces. Mean monthly ratios of pan to Piche evaporation for each station, rates of evaporation from standard pan to Piche for each month and correlations between records of Piche and U. S. open pan evaporimeters are presented in a table. For these stations the factors 1.410 and 0.880 serve to convert Piche data to standard pan evaporation for July to Sept. and other months of the year, respectively. (*Same item as* 9.1–139, Jan. 1958, *MAB.*) *Subject Headings:* **1. Pan evaporimeters 2. Piche evaporimeters 3. Evaporation measurements 4. India.**—*I.L.D.*

10H–67 551.508.72

Pikush, N. V., **Ispariteli s zhidkim indikatorom.** [Evaporator with a liquid indicator.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologischeskiĭ Institut, Trudy*, 4:109–111, **1955.** 7 eqs. **DWB**—With the aid of a diagram, the author describes the construction of an evaporimeter by means of which it is possible to measure evaporation for small time intervals with a high degree of precision. The apparatus consists of two cylinders, an outer cylinder and an inner one filled with soil. The outer cylinder is filled partly with heavy fluid (bromoform mercury CCl_4, etc.) so that the internal cylinder floats in this fluid. When the weight of the evaporimeter diminishes, the fluid in the tube moves to the evaporimeter, and when the weight increases (during precipitation) the fluid moves towards the reservoir. The recording of the fluid movement is described. An equation for calculating the dimensions of the details of the evaporimeter is derived and the sensitivity of the apparatus is calculated. *Subject Heading:* **1. Evaporimeters.**—*I.L.D.*

10H–68 551.501:551.573

Robertson, G. W., **Standardization of the measurement of evaporation as a climatic factor.** *World Meteorological Organization, WMO* [*Pub.*] No. 42, TP 16; *Technical Note*, No. 11, **1955.** 10 p. 14 refs. French, Russian and Spanish summaries preceding p. 1. **DWB**—"Latent evaporation," as distinguished from actual evaporation or "potential evapotranspiration," is defined in terms of the "maximum possible evaporation that could be obtained from a wet, plain, horizontal black surface exposed to meteorological conditions of solar and sky energy, wind, temperature, and vapor pressure which exist in the vicinity of plant and animal habitat." The container should be small enough to have a minimum influence on its own microclimate. The importance of evaporation in different fields of endeavor, the meteorological factors affecting evaporation and the physical characteristics of containers, the types of evaporimeters in use and their deficiencies and the superiority of the Bellani plate atmometer, are discussed. (*Same item as* 8.6–112, June 1957, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Latent evaporation 3. Evaporation measurement techniques.**—*M.R.*

10H–69 551.508.7:551.579.5 551.506:551.579.5

Schwarzmann, Herbert, **Ergebnisse und Erfahrungen an einer Lysimeteranlage in Karlsruhe.** [Results and experience at a lysimeter station in Karlsruhe.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 12:79–84, **1955.** 4 figs. **DWB**—The (weighing type) lysimeter which has been in operation in Karlsruhe since 1951 is described and its operation discussed. Precipitation, infiltration and evaporation data obtained during the first $3\frac{1}{2}$ years of operation are graphically presented and commented on. *Subject Headings:* **1. Lysimetry 2. Lysimeter observations. 3. Karlsruhe, Germany.**—*G.T.*

10H–70 551.508.72

Takeda, K. and Mori, T. (*Faculty of Agric., Kyushu Univ.*), **On the differential evaporation recorder.** *Journal of Agricultural Meteorology*, Tokyo, 11(1):23–25, July **1955.** 4 figs., ref. In Japanese; English summary p. 25. **DWB**—A new differential evaporation recorder is designed and constructed which records the amount of evaporation from a large evaporating pan. Two weights are suspended, respectively, in the pan and in a nonevaporating surface covered with oil, and their movements are mainly due to the differential effect of bouyancy exerted on them when the evaporation takes place, for the effect of thermal expansion of water acts at the same time on the weights, thus having no influences. The principle and the mechanism of the recorder is illustrated in figs. The size of the weights (radius = 3.3 cm) is determined by taking into consideration the effect of the friction of the recording pen and is found to have sufficient magnitude. The magnification of the recorder is variable by changing the ratio of lengths of the pen-arm as 5:1, 10:1, and 25:1. *Subject Headings:* **1. Evaporation recorders 2. Pan evaporimeters.**—*Author's abstract.*

10H–71 551.573:551.508.72

Uhlig, Siegfried, **Bestimmung des Verdunstungsanspruchs der Luft mit Hilfe von Piche-Evaporimetern.** [Calculation of evaporation force of the atmosphere by means of the Piche evaporimeter.]

Germany. Deutscher Wetterdienst, Mitteilungen, 2 (13), **1955.** 24 p. 14 figs., 9 refs. **DWB, DLC**—The author analyzes the atmospheric evaporation measurements made with a Piche evaporimeter carried out by the West German Weather Service at a network of stations from July 16 to Oct. 16, 1954. The contents of this monograph include the following: a description of the structure and handling of the Piche evaporimeter, effect of precipitation, wind and radiation upon the setting up of the instrument, graphs giving pentad values of evaporation at four stations, comparison between evaporation and other meteorological variables, annual variation evaporation, and actual evaporation and potential evapotranspiration of plant covered soil. (*Same item as* 9.4–179, April 1958, *MAB.*) *Subject Headings:* **1. Evaporation measurements 2. Piche evaporimeter 3. Evapotranspiration 4. West Germany.**—*I.L.D.*

10H–72 551.579.2:551.508.7

*U. S. Corps of Engineers. Snow Investigations, **Lysimeter studies of snow melt.** Its *Research Note*, No. 25, March 1, **1955.** 41 p. 5 tables, 6 plates (fold.), eqs. **DWB**—Runoff from an unforested 600 sq ft snow-lysimeter area is used as a measure of snow-melt quantities. The component melts due to radiation, convection, and condensation are computed from measured meteorological parameters and compared with the gaged runoff. Radiation and condensation melts are independently determined, the former from radiometer measurements and the latter from special moisture-exchange experiments. The residual (the difference between the lysimeter runoff and the melts from radiation and condensation) is considered to be due to convective heat transfer from the air. The magnitudes of and means of estimating the melt components are thus determined, special emphasis being given to the determination of condensation and convection melts. Equations for condensation and convection melts are presented which express melt as a function of the products of wind speed and the vapor-pressure differential between the air and snow (for condensation) and of wind speed and the temperature differential between the air and the snow (for convection). The equations so determined result in condensation melts of the same order of magnitude as those previously determined by SVERDRUP (1936), and convection melts of approximately one-third SVERDRUP's. The results of this study are used to compute daily snow-melt amounts with a standard error of estimate of 0.05 in. This is for daily melt quantities averaging 1.23 in and having a standard deviation of 0.31 in. The resulting correlation coefficient is 0.985. (*Same item as* 7G–218, July 1956, *MAB.*) *Subject Headings:* **1. Snow melt runoff 2. Lysimeter observations.I. Hildebrand, C. E. II. Pagenhart, T. E.**—*Author's abstract.*

10H–73 551.508.72

Vilkner, Hans, **Eine Verdunstungs-Fernregistriereinrichtung mit einer neuen Form eines Abtropfrohres.** [A distant recording evaporimeter with a new form of trickle tube.] *Zeitschrift für Meteorologie*, 9 (9):271–277, Sept. **1955.** 5 figs., 3 tables, 4 refs. **DLC**—The instrument consists of an evaporating cistern connected by a buried rubber tube to a filling tube, then through a damper to a trickle siphon tube and finally to a chamber with a float which transmits movement to a pen arm with a magnification of 10. Three methods of obtaining the normal level are compared: "board with nail," overflow pipe and trickle tube; the last presents numerous advantages. An example of a record with its evaluation is given. (*Same item as* 7.4–104, April 1956, *MAB.*) *Subject Heading:* **1. Evaporation instruments.**—*C.E.P.B.*

10H–74 551.508.72:551.573

Watanabe, M., **On the evaporation from a rather large pan.** *Journal of Meteorological Research*, Tokyo, 7 (9):560–564, Oct. **1955.** 5 figs., 6 refs., 15 eqs. In Japanese; English summary p. 560. **DWB, DLC.** Also issued as: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, 9 (1):38–42, Nov. **1955.** In Japanese; English summary p. 38.—The author made comparative observation of evaporation by installing two sizes of evaporimeters, diameters of which are 100 cm and 20 cm, respectively. From these observations the following relations were obtained: (1) An exponential relation exists between the evaporation from a large pan (E_1) and from a small pan (E_0), (2) The ratio of evaporation (E_0/E_1) decreases exponentially with wind-velocity increase, (3) The ratio of the evaporation (E_{cal}) from a lake to the evaporation from the large pan, $E_{cal}/E_1 = \varphi(E_1)$, is a function of E_1. Approximately, $\varphi(E_1)$ may be expressed as a Gaussian error function. (*Same item as* 7.11–239, Nov. 1956, *MAB.*) *Subject Heading:* **1. Pan evaporimeters.**—*Author's abstract.*

1956

10H–75 551.501.4:551.573 (57/8)

Afanas'ev, A. N., **K voprosu rascheta velichiny ispareniia s vodnoĭ poverkhnosti vodoemov nakhodiashchikhsia v fisikogeograficheskikh usloviiakh Sredne-Sibirskoĭ vozvyshennosti.** [The problem of calculating the magnitude of evaporation from the water surface of reservoirs under the physiographic conditions of the Central Siberian plateau.] *Meteorologiia i Gidrologiia*, No. 10:39–41, Oct. **1956.** fig., 2 tables, 2 refs. **DWB, DLC**—The various formulas of B. D. ZAĬKOV, and A. P.

Brasilavskiĭ and Z. A. Vikubina for computing evaporation from water surfaces of reservoirs are tested on the basis of actual data obtained on an evaporation area near the Angara River. Observations show that calculations by Zaikov's formula vary by only 2% from actual measurements. The influence of water basins upon evaporation from an experimental area is discussed. (*Same item as* 10.3–118, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation calculations 2. Evaporation from reservoirs 3. Central Siberian plateau.**—*I.L.D.*

10H–76 551.501.771:551.573

Elnesr, M. K., **Sur la détermination de l'évaporation dans l'atmosphère.** [Determination of atmospheric evaporation.] *Journal Scientifique de la Météorolgie*, Paris, 8(31).111–115, July/Sept. **1956.** table, 6 refs. French, English and Spanish summaries p. 111. **DWB**—Bowen's ratio, an important factor in the study of evaporation, has been determined by using a precise apparatus for measuring humidity as well as temperature gradients. The measurements were undertaken for 3 consecutive layers of air near a surface covered with short grass. No variation of this ratio with height was found. (*Same item as* 10.7–134, July 1959, *MAB.*) *Subject Headings:* **1. Evaporation measurements 2. Bowens ratio.**—*Author's abstract.*

10H–77 551.573(411)

Green, F. H. W., **A year's observations of potential evapotranspiration in Rothiemurchus.** *Institution of Water Engineers, Journal*, 10(5):411–419, Aug. **1956.** figs., tables, 5 refs. **DLC**—A special lysimeter-like evapotranspiration gage was used in 1955 at Achnagoichan Cottage in Rothiemurchus in the Cairngorms Nature Reserve (57°9′N, 3°49′W, elevation 1000 ft), Scotland, to determine the daily and monthly water budget. The gage is described and illustrated in detail and the methods of measurement discussed. Observed and estimated (after Penman, and Thornthwaite, respectively) evapotranspiration are compared and the actual evapotranspiration as calculated, the precip. storage in ground water deficiency and water surplus given for each month of 1955 and for each day from Aug. 18–28 and Nov. 17–23, 1955. A source of error may have been failure to consider wind. The year 1955 was very dry, giving a wide range of conditions to comment on (Feb. and March had a water surplus). (*Same item as* 9.3–211, March 1958, *MAB.*) *Subject Headings:* **1. Evapotranspiration data 2. Evapotranspirometers 3. Cairngorms, Scotland.**—*M.R.*

10H–78 551.573:581.11

Hesse, W. (*Inst. für Agrarmet., Leipzig Univ.*), **Der Wasserhaushalt von Kulturpflanzen.** [The water economy of cultivated plants.] *Geofisica Pura e Applicata*, Milan, 34:253–259, **1956.** 3 figs. (incl. photo), 20 refs., 2 eqs. German and English summaries p. 253. **DLC**—The water budget of cultivated plants is very complicated and liable to the influence of numerous environmental factors. Many methods have already been developed by meteorologists for the study of the evaporation. During the growing periods of 1950, 1953, 1954 and 1955 investigators in Leipzig used a newly developed, small lysimeter (of glass) and from 1954 on a measuring arrangement containing 6 small lysimeters (gauze lysimeters) of a different kind as well as a transpirograph. By means of the lysimeter installation it was possible to determine all components of the equation of the water balance and to draw conclusions regarding the complete water budget of the plants. Numerous measurements with six repetitions for each of them showed valuable results which are of great importance for agriculture, applied botany, etc. (*Same item as* 8.6–273, June 1957, *MAB.*) *Subject Headings:* **1. Evapotranspiration 2. Lysimeter observation 3. Plant water economy 4. Leipzig, Germany.**—*Author's abstract.*

10H–79 551.508.72:551.573

King, K. M.; Tanner, C. B. and Suomi, V. E., **A floating lysimeter and its evaporation recorder.** *American Geophysical Union, Transactions*, 37(6):738–742, Dec. **1956.** 5 figs., 12 refs., eqs. **Discussion** by L. L. Harrold et al., in *Ibid.*, 38(5):765–768, Oct., 1957. **DWB, DLC**—A weighing lysimeter is described which operates on Archimedes' principle and which has been used to obtain continuous values of evapotranspiration from an irrigated pasture. Some errors in evaluation of evapotranspiration by means of a lysimeter are discussed. (*Same item as* 8.10–100, Oct. 1957, *MAB.*) *Subject Headings:* **1. Lysimeters 2. Evapotranspiration measurement techniques. I. Harrold, L. L.**—*Author's abstract.*

10H–80 551.584(798)

*Mather, J. R. and Thornthwaite, C. W., **Microclimatic investigations at Point Barrow, Alaska, 1956.** *Drexel Institute of Technology, Lab. of Climatology, Publications in Climatology*, 9(1):1–51, **1956.** figs., tables, eqs. **DWB**—A comprehensive program of microclimatic observations was carried out at several sites at or near Point Barrow, Alaska during the summer of 1956 under the direction of C. W. Thornthwaite, and the Drexel Institute Lab. of Climatology. Instruments (evapotranspirometers, radiation, wind profile, air and soil temperature and dew point) were developed for the rigorous Arctic conditions. Sites are described and shown on a detailed map, instruments of all

types described and illustrated, the observational program outlined, and a substantial analysis of the heat and moisture balance and an evaluation of the results plus outline of the next year's program inc uded. The basic data obtained every 2 hours during the significant periods are presented in tables. (*Same item as* 10.3–20, March 1959, *MAB.*) *Subject Headings:* **1. Microclimatic research programs 2. Evapotranspiration in Arctic 3. Wind profiles 4. Point Barrow, Alaska. I. Hacia, H. II. Shellabear, W. H. III. Superior, W. J. IV. Ware, S. J.**—*M.R.*

10H–81 551.508.79:551.579.5

Parameswaran, S., **An apparatus for the determination of the water requirements of crops.** *Current Science*, Bangalore, 25(8):250–252, Aug. **1956.** fig. **DWB, DLC**—Daily water losses by evapotranspiration from a well-watered Jowan (crop) plot at Poona are shown graphically for July 10–Sept. 15, 1955, and the equipment for measuring the moisture in the soil tanks (inductance-capacitance oscillator) described. It is said to agree well with actual weighing of soil to determine the residual soil moisture; and is more sensitive. The relation of water losses to crop height is shown for 5 different heights, ranging from 1/2″ on July 13 to 3′4″ on Sept. 15. A total of 18.38″ of water was lost. (*Same item as* 10C–79, March 1958, *MAB.*) *Subject Headings:* **1. Soil moisture instruments 2. Electronic evapotranspirometers 3. Evapotranspiration losses 4. Poona, India.**—*M.R.*

10H–82 551.508.72:581.116

†Pfeifer, Fritz, **Eine Schwimmwaage zur Registrierung der Transpiration.** [A floating balance for recording transpiration.] *Zeitschrift für Meteorologie*, Berlin, 10(1):22–28, Jan. **1956.** 4 figs., 27 refs. **DWB**—Describes a floating lysimeter for recording the least change in the water use of plants. It is shown in diagram and photo; it consists of a 70 cm deep water basin (oil covered to prevent evaporation) with a float supporting an earth-filled cylinder in which the plants are growing, the lowest 10 cm of the cylinder being open to a supply of water in the float. Transpiration causes the float to rise slowly (3–5 mm/day) the movement being magnified 20–50 times on a drum. Examples of "transpirograms" are shown, including one of gain of weight by dew. (*Same item as* 7.9–99, Sept. 1956, *MAB.*) *Subject Heading:* **1. Evapotranspirometers.**—*C.E.P.B.*

10H–83 551.508.72:551.573(480)

*Porkka, M. T., **Results of measurements with Renqvist's evaporation recorder in South Finland in summer 1950.** *Geophysica*, Helsinki, 5(2):70–77, **1956.** 3 figs., 4 tables, 2 refs. **DLC**—Results of evapotranspiration (E) measurements at Tikkurila in South Finland (25°02′E, 60°17′N) with a Renqvist evaporation recorder, installed on a hill slope surrounded by an open field, in the summer of 1950 are compared with rainfall, sunshine duration, mean temperature, maximum temperature, saturation deficit, wind speed and cloudiness. Sunshine duration gave a correlation coefficient of $0.74 \pm .08$ and wind speed only $0.28 \pm .17$, whereas cloudiness was $-0.56 \pm .12$ when correlated with evapotranspiration. Dependence of E on maximum temperature at different wind speeds is shown on scatter diagram, showing that the effect of wind, while evident, is erratic. (*Same item as* 8.3–118, March 1957, *MAB.*) *Subject Headings:* **1. Evaporation measurements 2. Evapotranspiration 3 Renqvist evaporimeter 4. Tikkurila, Finland.**—*M.R.*

10H–84 551.508.7

Robertson, George W., **The measurement of latent evaporation using the central experimental farm plastic mount.** Ottawa, Canada, Division of Field Husbandry, Soils and Agricultural Engineering, Division of Illustration Stations, Central Experimental Farm, **1956.** 7 p. 3 figs., 2 tables. Mimeo.—Latent evaporation is the maximum possible evaporation under given conditions. A suitable instrument, the black Bellani plate atmometer with rain shield, and its exposure and operation are described. Tables give conversion of readings to latent evaporation. (*Same item as* 7.9–100, Sept. 1956, *MAB.*) *Subject Heading:* **1. Evaporimeters.**—*C.E.P.B.*

10H–85 551.508.7

Solopko, A. A., **Isparitel' dlia mikrometeorologicheskikh nabliudenii.** [Evaporimeter for micrometeorological observations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:54–56, Jan. **1956.** figs., 2 tables. **DWB, DLC**—Evaporation was measured by means of an evaporimeter in which the evaporating water surface consists of a round piece of wetted filter paper 25 cm² in area placed in the hollow of a metallic washer. Water is supplied to the filter through a 3 mm opening. The evaporated water is measured by means of the water added to the washer by a special burette. The results of evaporation measurements in several crop rotation fields carried out during May–Oct. are compared with those made by the method of water balance. (*Same item as* 8.11–135, Nov. 1957, *MAB.*) *Subject Heading:* **1. Evaporimeters.**—*I.L.D.*

10H–86 551.508.7

Stružka, Vladimír, **Evaporigraf pro mikrometeorologická měřní.** [Recording evaporimeter for micrometeorological measurement.] *Meteorologické Zprávy*, Prague, 9(1):18–23, **1956.** 11 figs.,

refs. Russian and German summaries p. 18. **DWB**—The recording evaporation meter developed by the author and described in this paper is based on the Piche evaporimeter. Photographs and diagrams of the instrument and its electrical circuit are presented. The apparatus is especially suited for detailed micrometeorological observation. Other evaporation instruments are mentioned and illustrated. (*Same item as* 8.11–136, Nov. 1957, *MAB.*) *Subject Heading:* **1. Recording evaporimeters.**—*G.T.*

10H—87 551.508.71:551.573

Taylor, R. J., **An electronic analogue of the saturated vapour pressure curve of water.** *Journal of Scientific Instruments*, 33(11):436–439, Nov. **1956.** 3 figs., 2 refs., 2 eqs. **DLC**—In connection with equipment to measure evaporation, a circuit is described, with wiring diagram, for measuring saturation vapor pressure by a complete electrical simulation of the psychrometric equation. It covers range from 0–30°C in three stages and is accurate to less than 1%. (*Same item as* 8.7–128, July 1957, *MAB.*) *Subject Headings:* **1. Vapor pressure measurement 2. Evaporation calculations.**—*C.E.P.B.*

10H–88 551.506:551.579.5:551.573(492)

*Uhlig, S. (*Bad Kissingen*), **Die Lysimeteranlage in Castricum (Nordholland).** [The lysimeters at Castricum (North Netherlands).] *Wasserwirtschaft*, Stuttgart, 47(2):42–43, Nov. **1956.** 2 figs., table, 5 refs. **DLC**—Describes a battery of four lysimeters each 625 m² and 2.5 m deep. A constant ground water level is mentioned. The following 5 year annual averages were obtained. Precipitation, 832 mm, evaporation from bare soil, covered with dead branches 195 mm, potential evapotranspiration, computed according to Penman 614 mm. The evapotranspiration from gass and brush exceeded the evaporation (195 mm) by a factor of 2.33. For a pine forest the factor was 2.79 and for an oak-alder-birch forest 2.15. *Subject Headings:* **1. Lysimeter observations 2. Evapotranspiration 3. Castricum, Netherlands.**—*A.A.*

1957

10H–89 551.573(431.5)

*Heigel, Karl, **Ergebnisse von Verdunstungsmessungen mit Piche-Evaporimetern, ihre Abhängigkeit von einigen meteorologischen Faktoren and von verschiedenen Standorten.** [Results of evaporation measurements with Piche evaporimeters, their dependence on some meteorological factors and on different locations.] *Meteorologische Rundschau*, 10(3):101–107, May/June **1957.** 9 figs., 5 tables, 7 refs. **DWB**—Observations of evaporation at Hohenpeissenberg in 1954–1956 at 0.5 and 2 m with Piches in the open, a screen and a wind tunnel are compared with saturation deficit, ventilation and sunshine duration. Evaporation in screen was 63% of that in the open. Evaporation, especially in the open at 2 m, shows a remarkable unexplained slackening at 6–8 a.m. Relations to sunshine duration are explained by relations of polar maritime, and of continental, sub-tropical and mixed air, to turbidity. Influence of locality is then discussed; at 2 m evaporation was much greater in an open meadow than in a "normal" exposure or in the screen. Evaporation is then compared at 0.5, 1.2 and 2.0 m in 1954. If 2 m is 100 m, meadow is 117%, 1.2 m 84% and 0.5 m 69%. (*Same item as* 8.11–204, Nov. 1957, *MAB.*) *Subject Headings:* **1. Evaporation measurements 2. Hohenpeissenberg, Germany.**—*C.E.P.B.*

10H–90 551.573:551.511

Izmailov, M. I., **Eksperimental'naia proverka teorii konvektivnogo teploobmena pri isparenii.** [Experimental verification of the theory of convective heat exchange during evaporation.] *Akademiia Nauk UzSSR, Izvestiia, Ser. Fisiko-Mathematich, Nauk*, No. 4:55–64, **1957.** 4 refs., 3 tables, 5 figs. (1 fold), 25 eqs.—In an earlier study (*Ibid.*, No. 3, **1957,**) on convective heat exchange during evaporation from a moist surface for the case of adiabatic process, the following hypothesis on the relationship of the "length of the mixing path" upon the parameters of the process was introduced:

$$l_\tau = C\sqrt{\frac{vgux}{u_0}} = l_0 x^{\frac{1}{2}} \;:\; l_0 = \sqrt{2/3\; l_\tau}.$$

In this study an earlier solution of a system of differential equations is verified experimentally. This system is:

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0$$

$$u\frac{\partial y}{\partial x} + v\frac{\partial u}{\partial y} = l_\tau{}^2\frac{\partial u}{\partial y}\frac{\partial^2 u}{\partial y^2} = a,\ \frac{\partial u}{\partial y}x^n \cdot l_\tau{}^n u_0$$

$$u\frac{\partial \theta}{\partial x} + v\frac{\partial \theta}{\partial y} = l_q{}^2 + \frac{\partial}{\partial y}\left(\frac{\partial u}{\partial y}\cdot\frac{\partial \theta}{\partial y}\right) + a^2\frac{\partial \theta}{\partial y}x^n{}_0 l_q{}^n$$

with limiting conditions:

$$y = 0, \quad u = 0, \quad u = u_m, \quad \theta = 1$$

$$y = y_0, \quad u = d_0, \quad u = 0, \quad \frac{\partial u}{\partial y} = 0, \quad \frac{\partial \theta}{\partial y} = 0$$

with solutions in the form of

$$u = u_0 f'(\epsilon)$$

$$v = 2/3 x^{-\frac{1}{3}} u_0 l_0^{\frac{1}{3}} [\epsilon f'(\epsilon) - f(\epsilon)]$$

$$\theta(y \cdot y) = \varphi(\epsilon) = -\frac{n}{F(\epsilon)} l - \int F(\epsilon) d;$$

where

$$\epsilon = l_\tau^{-\frac{1}{3}} y x^{-\frac{1}{3}}$$

$$f(\epsilon) = \frac{\varphi}{u_0 l_\tau^{\frac{1}{3}}} x^{\frac{1}{3}} = C_1 l^{-2l\epsilon} (C_2 \cos a\epsilon + C_2 \sin a\epsilon) + A.$$

The mean coefficient of heat yield along the length of the plate is determined by the formula

$$NU_{cp} = 0.351 \cdot Pr\ Re^{\frac{1}{3}} Gu^{\frac{1}{3}}.$$

The experimental set up including the apparatus used (illustrated by a diagram) and the procedure are described and the experimental results, namely, the distribution of temperature rate and amount of moisture evaporated are presented graphically. The comparison of theoretically obtained curves of temperature distribution and experimental data, and of experimentally obtained values of Nu with those obtained by different theoretical methods are presented. The theoretical formula for Nu agrees satisfactorily with the experimental formula of A. V. NESTERENKO. *Subject Headings:* **1. Convective heat exchange during evaporation 2. Evaporation theory.**—*I.L.D.*

10H–91 551.508.72:551.573(473)

Kaulina, K. I., **Opyt primeneniia isparitelei GGI-500 i gidravlicheskogo isparitelia maloĭ modeli na sel'skokhoziaĭstvennykh poliakh Kamennoĭ Stepi.** [Experimental use of the GGI-500 evaporator and a small-model hydraulic evaporator on agricultural fields of Kamennaia Steppe.] *Meteorologiia i Gidrologiia*, No. 1:47–50, Jan. **1957.** 2 figs., table, 3 refs. **DWB, DLC**—The comparative measurements of evaporation were carried out in a barley field, in a fallow field, and in a grass field. Data on evaporation are presented in graphs and in a table. The hydraulic small model evaporator and the GGI-500 (wooden model) at a height of 100 cm have higher evaporation rates than the GGI-500 (wooden and iron model) at 50 cm. Evaporation in June and July 1953 from the wooden and iron evaporimeters (GGI-500) at 50 cm was identical; after the harvest the evaporation from the wooden model exceeded that from the iron one. At the same time evaporation from GPI-51 (hydraulic evaporator) and the wooden model at 100 cm was always higher than the models at 50 cm. The differences in evaporation are analyzed in relation to rainfall, soil moisture content, etc. (*Same item as* 9.10–129, Oct. 1958, *MAB.*) *Subject Headings:* **1. Evaporimeters 2. Evaporation data comparisons 3. Kamennaia, Steppe, U.S.S.R.**—*I.L.D.*

10H–92 551.508.72

†Klausing, Otto, **Erfahrungen mit einem neuen Piche-Atmographen.** [Experience with a new Piche atmograph.] *Meteorologische Rundschau*, Berlin, 10(5):158–162, Sept./Oct. **1957.** 4 figs., 22 refs. **DWB, DLC**—The author describes a new Piche atmograph, which by utilizing a floating principle, records hourly and daily evaporation. The principle of this new device (which is similar to that of the Piche atmometer), its construction, installation, operation and evaluation of the records are described with the aid of diagrams and photographs. The device has a recording clock with a 7-day drum revolution period, the latter is adapted to the water supply which normally is adequate for a week, also under tropical conditions. A nomogram for evaluating the curve records is presented, and data obtained with this device in El Salvador (San Andrés) are presented. In addition, this study contains a discussion of the theoretical and technical problems of measuring evaporation and potential evaporation with special reference to the use of the Piche atmometer under transpirational and plant ecological conditions. (*Same item as* 9.10–130, Oct. 1958, *MAB.*) *Subject Headings:* **1. Piche atmograph 2. Evaporation measurement techniques.**—*I.L.D.*

10H–93 551.508.72:551.573

†McIlroy, I. C. (*C.S.I.R.O., Div. of Met. Physics, Melbourne*), **The measurement of natural evaporation.** *Australian Institute of Agricultural Science, Melbourne, Journal*, 23(1):4–17, March **1957.** 2 figs., numerous refs., 6 eqs. **DLC**—A review based on extensive literature of methods of

calculating evaporation from (a) the water balance, (b) the upward transport of water vapor near the ground, and (c) the energy considerations. Under (a) the use of free water surface evaporimeters, lysimeters, potential evapotranspirometers, and soil moisture profiles; (b) the Dalton equation and aerodynamic and direct eddy flux approach to vapor flow calculation and (c) various equations for energy calculation of evaporation and (d) combinations of (b) and (c). Advantages and disadvantages of each method are weighed. The indirect (equation) methods are more flexible but the direct methods the only ones practicable where energy components are unknown or altered by vegetation, etc. (*Same item as* 9.3–158, March 1958, *MAB.*) *Subject Headings:* **1. Evaporation measurement techniques 2. Evaporation instruments.**—*M.R.*

10H–94 551.501:551.573

Neumann, J., **Experimental attempt at measuring evapotranspiration by means of a heat unit system and the theory of turbulence.** *Israel. Meteorological Service, Series E*, No. 6, **(1957).** 6 p. 2 tables. In Hebrew. **DWB** (M055 185se). *Subject Heading:* **1. Evapotranspiration measurement techniques.**

10H–95 551.573:551.482

Schmuck, Adam, **Pomiary parowania na odrze pod wrocławiem (Komunikat wstepny).** [Measurement of evaporation of the Oder near Wrocław, Pt. 1.] *Przeglad Geofizyczny*, Warsaw, 2(1/2):-33–39, **1957.** 4 figs., 2 tables, 4 refs. French summary p. 39. **DWB, DLC**—Preliminary results of evaporation measurements of Oder River waters near Wrocław carried out with the aid of a Soviet GGI evaporimeter in the period July 1954–Oct. 1956 are presented and discussed. It has been found that the amount of evaporated water in summer is three times greater than it is in the winter period, and that evaporation declines with the increase of altitude. (*Same item as* 10.3–278, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation from rivers 2. Evaporimeters 3. Oder River, Poland.** —*A.M.P.*

10H–96 551.573:551.584.41

Selleck, G. W. (*Dept. of Plant Ecology, Univ. of Saskatchewan, Canada*), and Schuppert, K., (*U. S. Air Force, Hampton, Va.*)**Some aspects of microclimate in a pine forest and in an adjacent prairie.** *Ecology*, Durham, N. Carolina, 38(4):650–653, Oct. **1957.** 4 figs., table, 10 refs. **DWB**—Temperature, relative humidity and evaporation were measured at two sites with the same soil type in a pine forest and in a prairie, respectively, in and near a 23 yr old red pine stand at the University of Wisconsin Arboretum. Water losses were measured by the Lowry (1956) method. Water loss in the open was > 4 times that in the forest. In the forest there seemed to be no relation between evaporation and relative humidity. The pans with holes gave 13% less water loss by evaporation than the pans without holes, and agreed better with humidity in the prairie environment. (*Same item as* 10.5–130, May 1959, *MAB.*) *Subject Headings:* **1. Forest microclimates 2. Evaporation from forests and prairies 3. Univ. of Wisconsin Arboretum, Wisc.**—*M.R.*

10H–97 551.573:551.48(777)

†Shaw, Robert H. (*Prof. Agri. Climatology, Iowa State College*), **Comparison of methods of estimating evaporation from small water surfaces in Iowa.** Submitted Aug. 9, **1957** to the U. S. Weather Bureau in compliance with Memorandum of Understanding, Cwb-8808, May 1956. 45 p. 21 figs., 8 tables, 25 refs. Carbon of typescript. **DWB** (M73 S535co)—Small pond evaporation, as measured by three of the multiple methods existing, is discussed in relation to degree of effectivity. The study involves a review of literature, relationship of evaporation and evapotranspiration, evaporation from pan vs. pond and soil moisture data. The results are presented in graphs and tables. (*Same item as* 10C–105, March 1959, *MAB.*) *Subject Headings:* **1. Evaporation from ponds 2. Evaporation estimation 3. Iowa.**—*W.N.*

10H–98 551.573:551.508.72(435.1)

Vinck, Friedrich, **Die Verwertbarkeit von Piche-Evaporimetern für die Bestimmung der Gebietsverdunstung.** [Use of Piche evaporimeters in areal evaporation determination.] *Deutsche Gewässerkundliche Mitteilungen*, Coblenz, 1(4/5):73–76, Oct. **1957.** 2 figs., tables. **DWB**—In Schleswig-Holstein, evaporation measurements have been in practice since Nov. 1953. It is shown that the data obtained by the five lysimeters depend too much on local conditions to be useful for areal evaporation determination. It was suggested that the required network density could be achieved by the use of Piche evaporimeters which are far simpler and less expensive than lysimeters. In order to test the performance of Piche evaporimeters their results were compared with lysimeter data during 1955 and 1956. Preliminary findings of the comparison are reported in this paper. They are termed promising as the ratio lysimeter/evaporimeter reading appears to be directly related to rainfall amount. (*Same item as* 9.10–224, Oct. 1958, *MAB.*) *Subject Headings:* **1. Areal evaporation meas-**

urements 2. Piche evaporimeter 3. Lysimeter-evaporimeter data comparisons 4. Schleswig-Holstein, Germany.—*G.T.*

1958

10H–99 551.501:551.573 551.571:551.511

Deacon, E. L. and Swinbank, W. C. (*both, Div. of Met. Physics, CSIRO, Victoria*), **Comparison between momentum and water vapour transfer.** *UNESCO, Arid Zone Research*, 11:38–41, pub. **1958.** 2 figs., 7 refs., 9 eqs. French summary p. 40. **DWB** (M84 US8cl)—Direct evaporation measurements, made over grass by means of an eddy correlation technique, are compared with calculated values derived from horizontal tangential stress measurements made with the same technique. There is no indication of a systematic discrepancy between the transfer coefficients of water vapor and of momentum. This is confirmed by a similar analysis of RIDER's data, and by a comparison of correlation coefficients vertical velocity-humidity and vertical velocity-horizontal velocity. An improvement of the THORNTHWAITE–HOLZMAN–PASQUILL method or measuring evaporation from natural surfaces yields a formula applicable to all states of stability and with no limitations as to the height at which wind velocity and humidity are measured. *Subject Headings:* **1. Evaporation measurement techniques 2. Water vapor transfer.**—*Transl. of authors' abstract.*

10H–100 551.573:551.501.9(410)

Green, F. H. W. (*Nature Conservancy, Gr. Britain*), **Problems raised by the operation of, and the results from, a small network of British evaporation measuring stations.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], Vol. 3, pub. **1958.** p. 444–451. 3 figs., table **DWB** (M(06) I611g)—An attempt has been made, with the aid of a simple version of the apparatus and technique developed by THORNTHWAITE, to obtain "standardized" measurements of potential evaporation (or "evapotranspiration") at a number of places in Great Britain—mainly in Scotland—which have significantly different climatic regimes. The experiment has, on the whole, given satisfactory results. Some operating problems have arisen, some of which have been largely solved, while others present some interesting queries. Both the discrepancies and the problems, including the following, are briefly discussed in the Paper: 1) the apparently systematic regional differences in potential evaporation, lending support to the belief that this climatic factor has a precise meaning, apart from differences due to local surface variations; it could thus have a "standard" value for a station comparable to its "standard" screen temperatures; 2) although there is general agreement between the observed values of potential evaporation and those computed by PENMAN's and THORNTHWAITE's formulas, there are some interesting and significant differences; 3) the application of a factor to allow for "over-exposure" of the apparatus in dry weather; 4) the problem of "negative values" of evaporation; 5) the practical application of the potential evaporation concept to water budgets. *Subject Headings:* **1. Potential evaporation 2. Evaporation networks 3. Great Britain.**—*Author's abstract.*

10H–101 551.508.72:551.573

Holmes, R. M. and Robertson, G. W. (*both, Canada Dept. of Agri., Ottawa*), **Conversion of latent evaporation to potential evapotranspiration.** *Canadian Journal of Plant Science*, Ottawa, 38:164–172, April **1958.** 3 figs., 5 tables, 10 refs.—Potential evapotranspirometers and various evaporation pans are commonly used to estimate potential evapotranspiration. These instruments are expensive, large, difficult to install and use. A black Bellani plate atmometer is suggested as a simple instrument to replace these large tanks. It consists of a black, porous, ceramic plate, mounted on a glazed ceramic cup. The plate surface is kept moist by the water held in the cup. Evaporation from this surface is a measure of the drying ability of the air and is called "latent evaporation." Comparisons of various evaporimeters have shown the Bellani atmometer to be accurate and responsive to meteorological variables. Latent evaporation was compared with open-pan evaporation (from a 4-ft diameter buried tank) at several sites across Canada. Latent evaporation was also compared with evapotranspiration from irrigated field plots and evapotranspirometer tanks. The conversion factor of 0.0034 in. of evapotranspiration from irrigated fields, and 0.0032 in. of open-pan evaporation for each cubic centimetre of latent evaporation has been tentatively established. Latent evaporation and moisture block methods have shown excellent agreement in scheduling irrigation. *Subject Headings:* **1. Bellani atmometers 2. Potential evapotranspiration.**—*Author's abstract.*

10H–102 551.508.72:551.573(94)

Hounam, C. E. (*Commonwealth Bureau of Met., Melbourne*), **Evaporation pan coefficients in Australia.** *UNESCO, Arid Zone Research*, 11:52–60, pub. **1958.** 4 figs., 5 tables, 19 refs., 2 eqs. French summary p. 60. **DWB** (M84 US8cl)—From a comparison of evaporation values derived from evaporation pan measurements, water tank measurements and calculations by Penman's equation (which is found reliable) show that pan coefficients vary widely according to geographical location throughout Australia. The author concludes that "the adoption of a universal pan coeffi

cient for the Australian tank does not appear justified" and the need for such a coefficient" is superseded by a direct estimate based primarily on radiation measurements." He recommends "establishment of an inner ring of radiation recording stations representing the arid interior." *Subject Headings:* **1. Pan evaporation coefficients 2. Australia.**—*G.T.*

10H–103 551.508.72:551.573(435.15)

Klockow, Wolfgang (*Hamburg-Quickborn*), **Erfahrungen mit einer einfachen Anlage zur Bestimmung der Verdunstung.** [Experiences with a simple device for determining evaporation.] *Annalen der Meteorologie*, Hamburg, 8(5/6):171–178, **1958.** 3 figs., table, 14 refs., 8 eqs. **DWB, DLC**—After a brief evaluation of various methods of measuring and computing evaporation from an artificial surface (lysimeters, weighing, water level determinations), the author describes the method employed at the Quickborn Experimental Field of the Hamburg Meteorological Observatory. This consisted of a glazed clay tank inserted into the ground with the surface at the same level as the ground. The surface of the tank is 5280 cm² and its depth is 100 cm. A porous square wooden tube 4 cm wide and 100 cm deep was buried on the inside and outside of the northern edge of the tank; both possess a flat cap. In these tubes the water level is measured with a measuring rod. The amount of water evaporated is given by the equation $V = V_N + V_W \times V_F + V_{Bf}$; where V_N—precipitation upon the ground, V_W—water level, V_F—amount of water added or removed and V_{Bf}—soil moisture. The determination of these elements and their quantitative expressions are presented, and the evaporation equation is given by

$$V = N - a\Delta W + \frac{z - A}{F} - \int_0^H \Delta \cdot \frac{Bf \cdot S}{100}\, dh.$$

The practical application of this formula and the results of evaporation measurements made in 1957–1958 are presented. The value of this method lies in the fact that its exactness increases with enlargement of the time interval. . . *Subject Headings:* **1. Evaporation tanks 2. Evaporation measurement techniques 3. Hamburg, Germany.**—*I.L.D.*

10H–104 551.508.72:551.501.73

†Kohler, Max A. (*Chief Res. Hydrologist, U. S. W. B.*), **Meteorological aspects of evaporation phenomena.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], Vol. 3, pub. **1958.** p. 421–436. 5 figs., 4 tables, 20 refs. **DWB** (M(06) I611g)—Techniques for estimating pan and lake evaporation from meteorological data are described and evaluated. The relation between lake evaporation and that from various types of pans is also considered and the relative merits of recognized pans are discussed. It is concluded that while evaporation from the U. S. Weather Bureau Class A pan is a good index to lake evaporation, supplemental meteorological observations improve the reliability of estimated reservoir losses. Also, changes in heat storage of the reservoir must be taken into account if reliable monthly estimates are required. The application of free-water evaporation relations to basin accounting and river forecasting is now under investigation and a brief description of this work is presented. *Subject Headings:* **1. Evaporation estimation 2. Pan evaporimeters.**—*Author's abstract.*

10H–105 551.573:551.588.6·551.501.73

Law, Frank (*Engineer to the Fylde Water Board, Blackpool, Lancashire, England*), **Measurement of rainfall, interception and evaporation losses in a plantation of Sitka spruce trees.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 2, pub. **1958.** p. 397–411. 4 figs., 4 tables, 2 refs. **DWB** (M(06) 1161g)—A special meter has been used by the British to measure the runoff from underneath a concrete wall that surrounds one-ninth of an acre within a dense plantation of Sitka spruce trees. Three gages on poles near the top of the wall and gages at ground level in adjacent open areas were used to measure the precipitation in the area. In addition, ten gages placed at different points of the plantation floor were used to measure the amount of water that reached the ground level. This report gives the techniques used for precipitation measurement on the canopy and the amount penetrating same and reaching the ground. The results are analyzed. During the dry period from July 4, 1955 to July 8, 1956, precipitation was 39 in.; of this 24 in. reached the forest floor. The runoff was equivalent to less than 11 in. of rain. The grass loss was about 28 in. compared with the 16.6 in. over the adjacent water supply catchment and 15.5 in. measured on a nearby grass covered gauge. *Subject Headings:* **1. Evaporation loss in forests 2. Evaporation-precipitation measurements.**—*N.N.*

10H–106 551.508.72:551.573(945)

McIlroy, I. C. (*Div. of Met. Physics, CSIRO, Melbourne*), **A lysimeter installation at Aspendale.** *UNESCO, Arid Zone Research*, 11:45–47, pub. **1958.** 2 figs., ref. French summary p. 47. **DWB** (M84 US8cl)—A projected installation of 12 weighing lysimeters at the Meteorological Physics Laboratory at Aspendale, Australia, is described. The installation will be used mainly for investigat-

ing problems connected with evapotranspiration, soil-plant-atmosphere moisture relationships, and instruments and techniques. The lysimeter measurements will be supplemented with standard meteorological (including soil parameters) and special micrometeorological observations. *Subject Headings:* **1. Lysimeters 2. Evaporation measurement techniques 3. Aspendale, Australia.**—*G.T.*

10H–107 551.584.41:551.573

Nebiker, Walter A. and Orvig, Svenn, **Evaporation and transpiration from an open lichen woodland surface.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, pub. **1958.** p. 379–384. fig., table, 11 refs. **DWB** (M(06) I611g)—In 1948 the Department of Geography, McGill University, began an investigation of surface characteristics of Labrador-Ungava by means of aerial photographs. Two series of maps have been completed, showing cover types and physiography. These maps can be used in a determination of albedo and energy-partitioning for each of the characteristic cover types. Moisture conditions must be studied, as well, for each main type. Measurements of evapotranspiration and evaporation throughout the growing season, at one location, constitutes the first phase of this project. A battery of evapotranspirometer tanks was installed at the McGill Knob Lake Research Station, and also two black Bellani plate atmometers for the measurement of latent evaporation. Due to low temperatures, evapotranspiration at Knob Lake is confined to the months June–Sept. Some evaporation takes place from the snow covered surface in winter. The site was a burned over area, with lichen the dominant vegetation, principally *Cladonia alpestris.* It was found that with a lichen cover the evapotranspiration was only 1/3 of the theoretically estimated amount. This difference is probably due to the characteristics of the lichen cover rather than to any peculiarity of climatic conditions. *Subject Headings* **1. Evaporation from woodland 2. Evapotranspiration.**—*Authors' abstract.*

10H–108 551.508.72

Robertson, G. W. and Holmes, R. M. (*both, Field Husbandry, Soils and Agricultural Eng. Div., Canada Dep. of Agricul.*), **A new concept of the measurement of evaporation for climatic purposes.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, pub. **1958.** p. 399–406. 3 figs., 5 tables, 9 refs. **DWB** (M(06) I611g)—The black Bellani plate atmometer is a simple device which can be used to measure the drying ability of the air or "latent evaporation." The instrument is small and inexpensive and overcomes most of the undesirable features of other atmometers. Because it is small, it is easily exposed to meteorological elements. Since the evaporating surface is black, it responds readily to solar radiation as well as to other meteorological factors affecting evaporation. Latent evaporation, expressed as cubic centimeters of water lost from the atmometer, can be considered as an index of the drying ability of the air. This index affords a means of making relative comparisons of the drying ability of the air from one day to another or from one site to another. Latent evaporation can be related to evaporation from pans, reservoirs, transpiration from crops, etc. The establishment of such relationships will increase the usefulness of latent evaporation data. Presently measurements are being made at more than 40 Agricultural Experimental Stations in Canada. *Subject Headings* **1. Bellani evaporimeter 2. Evaporation networks 3. Canada.**—*Authors' abstract.*

10H–109 551.506:551.573

Suzuki, S. and Fukuda, H. (*both, Univ. of Tokyo*), **A method of calculating potential evapotranspiration from pan evaporation data.** *Journal of Agricultural Meteorology,* Tokyo, 13(3):81–85, Feb. **1958.** 6 figs., 3 tables, 8 refs., eqs. In Japanese; English summary p. 85. **DWB**—In order to measure the actual value of potential-evapotranspiration (PE) (tank PE + rain—drained water) of upland rice and barley in field with volcanic ashy loamy soil, we used a tank (diameter 4 m, depth 50 cm, ground water level 45 cm from field surface) like that used by THORNTHWAITE. The tank was surrounded by the same crops raised by ordinary method, where ground water level is deeper than 15 m. The amounts of water evapotranspirated from the tank and also from a standard pan used in Japan (diameter 20 cm, height 10 cm) were measured, and we obtained the following results: a) The evapotranspiration measurements by BLANEY'S, CRIDDLE'S and THORNTHWAITE'S methods were less accurate compared to that of the pan. b) PE was found to be a function only of meteorological factors, regardless of the growth stages of crops. c) PE was about 1.2 times the amount from the pan in each month of the growing season. d) The actual PE is calculated with considerable accuracy by

$$\text{actual PE} = \text{tank PE in no-rain period} \times \frac{\text{mean daily amount of pan evaporation in each month}}{\text{mean daily amount of pan evaporation in no-rain period of the corresponding month}}$$

Subject Headings: **1. Pan evaporation data 2. Potential evapotranspiration.**—*Author's summary.*

10H–110 551.573:551.508.72

Taylor, R. J. (*Div. of Met. Physics, CSIRO, Melbourne*), **The automatic, direct, measurement of natural evaporation.** *UNESCO, Arid Zone Research*, 11:42–44, pub. **1958.** 5 refs., 2 eqs. French summary p. 44. **DWB** (M84 UX8cl)—An evaporimeter based on measurement of the components of vertical water vapor transport and consisting of anemometer, hygrometer, multiplier and integrator is described. The components of the instrument have been developed, assembled and calibrated at the Division of Meteorological Physics, CSIRO, Melbourne, Australia and the first field trials have been found satisfactory. *Subject Headings* **1. Evaporimeters 2. Evaporation measurement techniques.**—*G.T.*

10H–111 551.508.72:551.573

Taylor, R. J. and Dyer, A. J. (*both, Div. of Met. Physics, Commonwealth Sci. and Ind. Res. Organ., Aspendale, Victoria, Australia*), **An instrument for measuring evaporation from natural surfaces.** *Nature*, London, 181(4606):408–409, Feb. 8, **1958.** 2 figs., 6 refs. **DWB, DLC**—A description of an instrument which permits the automatic direct determination of natural evaporation by equating it to the vertical turbulent flux of water vapor in the layers of air near the ground. "The validity of this equation demands that there be no vertical transport of water vapor between the ground and the level of the instrument and that a measurement of turbulent flux made at a point be representative of the area." The turbulent flux of water vapor is given by the covariance between (1) the product of air density (ρ) and the vertical velocity component (ω) and (2) the specific humidity (q). The principle involved was first used by SWINBANK. The instrument provides continuous electrical signals proportional to $\rho\omega$ and q, and performs the necessary mathematical operations of multiplication and integration automatically. The sensing devices are mounted 1.5 m above the ground and response times of about 0.3 sec are needed in the anemometer, hygrometer and multiplier in order to take into account contributions of flux made by the smallest eddies. The anemometer which is of a new design (*J. Scient. Inst.*, 35:47–52, Feb. **1958**) is linear. The hygrometer is based on fine wire, wet and dry bulb resistance thermometers designed by MCELROY (*Australian J. Agricul. Res.*, 6:196, **1955**). The integrators are of the electromagnetic type described by GILBERT (*Rev. Sci. Instr.*, 18:318, **1947**). A photo of the evaporimeter and a graph giving observed values of evporation rate are presented. (*Same item as* 10.2–142, Feb. 1959, *MAB.*) *Subject Headings* **1. Evaporimeters 2. Evaporation measurement techniques.**—*I.L.D.*

10H–112 551.511.32:551.573

Tomitaka, S., **The amount of evaporation in the light of energy budget.** *Journal of Meteorological Research*, Tokyo, 10(3):198–240, March **1958.** 6 figs., 5 tables, 4 refs., 13 eqs. In Japanese; English summary p. 198. **DWB, DLC.** Also, Ito, **[Comments on] S. Tomitaka: The amount of evaporation . . . [and] Reply by Tomitaka.** *Ibid.*, 10(6):536–537, June **1958.** 2 refs. In Japanese. **DLC**—In order to estimate the amount of evaporation, the energy-balance method is employed. Energy consideration at the boundary between the air and the stagnant water leads to the following relation:

$$I - rI + I_B + K + E + c\rho\kappa^2 \frac{\partial T}{\partial z},$$

where I = incoming solar radiation, rI = reflected solar radiation, I_B = upward flux of (long wave) radiation, K = flux of sensible heat from the surface, E = heat consumed for evaporation, and $c\rho\kappa^2 \frac{\partial T}{\partial z}$ = downward flux of heat carried into the water and stored there. From this the following equation is obtained to estimate the amount of daily evaporation.

$$\epsilon = \sum_{i=1}^{=6} \frac{I_i(1-r)_i - I_{Bi} - c\rho\kappa^2 \left(\frac{\partial T}{\partial z}\right)_i}{(1+q)_i L},$$

where ϵ = amount of evaporation (mm/day), L = latent heat of evaporation = 590 cal/gr and the summation is taken for every hour. The amount of evaporation on fair days is calculated for each month in 1956. These values agree fairly well with the measurements by evaporation pan, considering the assumption employed here that the water temperature is constant and Bowen's ratio is roughly equal to 0.1. Several remarks are added for the method of observation with evaporation pan. (*Same item as* 10.3–214, March 1959, *MAB.*) *Subject Headings* **1. Evaporation estimation 2. Energy balance method of evaporation calculation.**—*Author's abstract.*

10H–113 551.508.72 551.508.79:551.579.5 551.508.71

†World Meteorological Organization. Commission for Instruments and Methods of Observation, **Measurements of evaporation, humidity in the biosphere and soil moisture.** Report of a Working

Group . . . prepared by N. E. Rider, chairman. *World Meteorological Organization, Technical Note*, No. 21; WMO (Pub.) No. 72. Tp. 28, **1958.** 49 p. table, 136 refs. French, Russian and Spanish summaries. **DWB, DLC**—The substance of the report on the measurement of soil moisture and related studies is presented under joint authorship of the Working Group set up by the president of the Commission for Instruments and Methods of Observation, in accordance with recommendations made previously (CIMO-I and CAgM-I). A comprehensive summary of the available information on soil moisture measurement is given detailed treatment, with particular attention to the suitability of the instruments available for (a) the continuous recording of soil moisture, (b) the measurement of real evaporation and evapotranspiration, and (c) the measurement of the humidity content of the biosphere. A selected bibliography illustrating the main lines of theory and research in the particular fields is included. (*Same item as* 10C-143, March 1959, *MAB.*) *Subject Headings* **1. Soil moisture measurement techniques 2. Evaporation measurement techniques 3. Humidity measurement techniques. I. Rider, N. E.**—*R.P.*

1959

10H–114 551.573:627.1

Harbeck, G. E., Jr. and Koberg, Gordon, E. (*U. S. Geological Survey, Denver*), **A method of evaluating the effect of a monomolecular film in suppressing reservoir evaporation.** *Journal of Geophysical Research*, Wash., D. C., 64(1):89–93, Jan. **1959.** table, 10 refs., 8 eqs. **Discussion** by Max Kohler, *Ibid.*, 64(8):1066–1068, Aug. **1959. Discussion** by N. J. Cochrane, and **Reply** by authors, p. 1069–1070. **DLC**—Evaporation from a water surface may be reduced by the application of a monomolecular film. Because of possible seasonal variations in evaporation-pan coefficients, computed saving in evaporation may be unreliable if based upon evaporation-pan records. A more reliable measure of the evaporation reduction is obtained by the solution of equations based upon energy budget and heat and mass transfer theory. The rise in water-surface temperature caused by application of the film can be computed. *Subject Headings:* **1. Evaporation from reservoirs 2. Pan evaporation data.**—*Author's abstract.*

10H–115 551.573:551.508.72

Rogers, P., **Comparisons of evaporation pans.** *World Meteorological Organization, WMO Bulletin*, 8(2):95–98, April **1959.** 2 figs., photo. **DWB**—Prior to IGY, members of the WMO, CIMO recommended that the U. S. Class A evaporation pan be used as an international standard for comparison and be installed at all new stations set up for IGY and also that comparisons be made between this and other types set up alongside. A. R. Konstantinov of the U.S.S.R. made comparisons in 1957 at the Valdai experimental station near Leningrad (moisture surplus) and at Dubovka (47°22′N; 42°41′E) in a zone of moisture deficit. It was found that the U. S. type A pan gave wider variation when exposed at the standard height above the ground and the U.S.S.R. type GGI-3000 pan gave even greater departure from the large standard (20 M²) tank, but that the latter gave better results when exposed, as it usually is placed below the ground (to avoid turbulence and increased wind speed) and the U. S. type A pan did quite well when sunk in the ground. Seasonal (May–Sept.) and diurnal (0–24h) variations are shown in a comparative graph. Max Kohler comments that heat exchange is a serious factor when pans are sunk in the ground, accounting for lag. *Subject Headings:* **1. Evaporation pan comparisons 2. U. S. Type A Evaporation pans 3. U.S.S.R. Type GGI-3000 evaporation pans 4. Valdai, U.S.S.R.**—*M.R.*

10H–116 551.573:551.508.72

Subrahmanyam, V. P. (*Dept. of Geophys., Andhra Univ.*), **Pan evaporation and potential evapotranspiration.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):3–6, Jan. **1959.** 2 figs., 15 refs. **DWB, DLC**—A brief but detailed review of the more significant results obtained from contemporary research into instrumentation and techniques relative to evaporation measurement. Although pans or tanks, because of the ease of operation, are universally popular, they have been found unsatisfactory in use over large surfaces when weather conditions are not favorable. The need for a satisfactory coefficient is stressed, i.e., a multiplying factor to be applied to an evaporimeter reading to give the appropriate value of evaporation for a large water surface subjected to the same weather conditions. *Subject Headings:* **1. Pan evaporation 2. Potential evapotranspiration 3. Evaporation measurement techniques.**—*R.P.*

10H–117 551.508.72:551.573(471.1)

*Venkiteshwaran, S. P.; Jagannathan, P. and Ramakrishnan, S. S. (*all, Met. Office, Poona*), **Some experiments with the U.S.A. standard evaporimeter.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(1):25–36, Jan. **1959.** 2 figs., 14 tables, 5 refs. **DWB, DLC**—The U. S. standard evaporimeter is in regular use at a number of selected agricultural farms in the Indian States and in the observatories of the India Meteorological Department. The evaporimeter consists of a

cylindrical reservoir 48″ in diameter and 10″ high supported on a wooden frame 4″ high. The level of the water in the reservoir is maintained at about 2″ from the rim so that the height of the level of water is nearly 12″ above ground. The evaporimeter is of 20 SWG copper sheet. The evaporation is measured by accurately determining with the hook-gage the change in the level of water in the reservoir after any given interval of time. The hook gage is placed on a still well provided with levelling screws. This instrument is fairly in wide use at many stations in India for measurement of evaporation. To ensure the comparability of observations recorded at different stations, care is taken as far as possible to keep to the standard of specifications prescribed for the instrument and also to maintain similar conditions of exposure at all stations. But, it was noticed that some conditions of exposure such as the color of the paint on the evaporimeter, the depth of water level in the tank, etc. could not be maintained identical at all the places at all times. It was, therefore, considered desirable to investigate the extent of the effects of such uncontrollable variations in the conditions of exposure. In the series of experiments designed for such a purpose, some more factors of variation such as the height of the tank above the ground, size of tank, etc. have also been included for testing. The series of experiments were conducted in the Central Agricultural Meteorological Observatory at Poona and the results of the observations are summarized below. It may also be mentioned here that in an observatory there is a contribution to the loss of water from an open tank evaporimeter by birds., etc. In the series of experiments discussed here such losses have been avoided by suitable watch and maintenance conditions. *Subject Headings:* **1. Evaporimeters 2. Poona, India.**—*Authors' introduction.*

SUPPLEMENTARY MATERIAL

10H–118 551.508.72:551.573(02)

Pfau, Rolf (*Offenbach a.M.*), **Anleitung zur Durchführung und Auswertung von Messungen mit dem Popoffgerät.** [Guide for the operation and evaluation of measurements with the Popov lysimeter.] *Meteorologische Rundschau*, Berlin, 11(3):102–103, May/June **1958. DWB, DLC**—In connection with the widespread use of the Popov lysimeter at the agrometeorological stations of the German Weather Service, the latter set up a procedure for making and evaluating measurements with the Popov apparatus. The first part of this guide, which is to be part of the **Meteorologische Registrier—und Sondergeräte** [Meteorological Recording Services and Special Apparatus], contains a description of the three vessels which constitute the apparatus and which are filled with soil—one of these vessels stands above a funnel with a device for receiving percolating water while the other two are in immediate contact with the soil. For a given precipitation (RR) the percolated water, **z**, and the change in weight of the vessel p, is measured and evaporation *e* is determined by applying the balance equation to this vessel with the funnel—this vessel is thus an evaporimeter. The actual percolation is determined by the balance vessel, the water balance (p) of which is determined daily; this vessel is the lysimeter. The actual percolation is determined from $RR-e-p=z$. The other sections of the guide describe in detail the evaluation of the data. *Subject Headings:* **1. Lysimeters 2. Evaporimeters 3. Evaporation instrument manuals.**—*I.L.D.*

10H–119 551.573:551.508.72

†Stocker, O., **Messmethoden der Transpiration.** [Methods of transpiration measurement.] *Handbuch der Pflanzenphysiologie*, Berlin, Vol. 3:293–311, **1956.** 13 figs., bibliog. p. 309–311. **DLC** (QK711.R83)—Transpirometers and methods of measuring transpiration in plants (since 1727 when ST. HALES published the first article on this subject) are dealt with in detail, with ample illustration of ancient and recent methods. Among these methods are: the weighing method, measuring condensed transpiration, the photometric or water balance method and the wilting-point method. Gasometric methods in still and moving air, cobalt paper and hygrometric methods, indirect methods based on surface, weight and thermal balance, etc., are considered systematically with a long list of references cited. *Subject Heading:* **1. Evapotranspiration measurement techniques.**—*M.R.*

10H–120 551.573

Turner, J. A., **A simplified scheme for computing Thornthwaite's potential evapotranspiration.** *Canada. Meteorological Branch*, CIR-31118; TEC-284, Oct. 27, **1958.** 12 p. 4 figs., 2 tables, 4 refs. **DWB, DLC**—A simplified technique is developed for computing potential evapotranspiration from THORNTHWAITE's equations. Over the range of conditions encountered in Canada, this approximation gives results which agree with those obtained exactly from THORNTHWAITE's equations within 0.1 in. per month. The time saved when computations are to be made for a number of stations is appreciable, and the loss of accuracy is more apparent than real because of the errors inherent in the original empirical relationships. *Subject Headings:* **1. Potential evapotranspiration measurement techniques 2. Thornthwaite's method.**—*Author's abstract.*

10H–121 551.573:581.11:631.67

van't Woudt, Bessel D. (*Hawaii Agri. Experiment Station, Honolulu*), **Estimation of water requirements for irrigation planning.** Reprint from *International Commission on Irrigation and Drainage, Annual Bulletin* **1957.** 10 p. 5 figs., 21 refs. English and French summaries, p. 1. **DWB**—Evapotranspiration losses in irrigation are not as significant as is sometimes supposed, at least in Hawaii. Other indeterminate water losses are often so great that the need to obtain accurate estimates of potential evapotranspiration is lessened. Difficulties in obtaining PE from meteorological data, such as temperature due to variable crop coefficients, are discussed. Pan evaporation is considered the most valuable and simple method if variations in albedo and crop cover are considered. Energy (advected heat) brought from nonirrigated to irrigated areas cause crop coefficients to vary from season to season. Thornthwaite's and Penman's method are compared with pan evaporation methods and the latter method discussed at some length. Finally, effect of ground cover, seepage and irrigation efficiency are discussed. *Subject Headings:* **1. Irrigation requirements 2. Evapotranspiration losses 3. Pan evaporimeters.**—*M.R.*

10H–122 551.508.71

Woelfle, F., **Hütten-Psychrometer mit Dauerbefeuchtung und elektrischem Aspirator.** [Shelter-psychrometer with constant moistening and an electric aspirator.] *Meteorologische Rundschau*, Berlin, 10(6):185–186, Nov./Dec. **1957.** fig. **DWB, DLC**—A description with the aid of a diagram of a new type of shelter psychrometer in which errors resulting from manual moistening from opening the shelter for a long period in order to moisten, etc. are eliminated. Both the dry and wet bulb thermometers are ventilated simultaneously by means of a bellows driven by a small electric motor which is capable of producing an air current of 3 m/sec at 7.5 volts. The water for moistening is in a vessel from which a wick like mesh envelops the end of the thermometer. Beneath the wet bulb thermometer the wick is exposed for a length of 1 cm to the air current. The water led up from the container assumes the wet bulb temperature while in the wick and accordingly it cannot falsify the wet bulb temperature even during intensified evaporation and increased water transport. *Subject Heading:* **1. Psychrometers.**—*I.L.D.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Cohen, Raymond K. and Nelson, Michael: **Evaluation and control of sweat damage.** *Stanford Research, Institute, Report* No. 5, 1958. 123 p. Review in *Mariners Weather Log*, Wash., D. C., 3(2):41, March 1959.

Collins, W. V.: **The perpetual forest.** Phila., Lippincott, 1959. Price $4.50. Review by W. J. Beecher in *Science*, Wash., D. C., 129(3364):1669, June 19, 1959.

Condon, E. U. and Odishaw, Hugh, eds.: **Handbook of physics.** N. Y., McGraw-Hill, 1958. 1504 p. Price $25.00. Review by Wallace R. Brode in *Optical Society of America, Journal*, 49(1):104–106, Jan. 1959.

Dumont, R.: **L'ionosphère et l'optique géométrique des ondes courtes** [The ionosphere and geometric optics of short waves]. Paris, Dunod, 1958. 100 p. figs., refs. Review in *La Météorologie*, Paris, Ser. 4, No. 49:75, Jan./March 1958.

Haltiner, G. J. and Martin, F. L.: **Dynamical and physical meteorology.** N. Y., McGraw-Hill, 1957, 470 p. Review by E. Knighting in *Meteorological Magazine*, London, 88(1,042):121–123, April 1959. (*For abstract on this title, see* 9.4–5, April 1958, *MAB*)

Herdman, H. R. P. and Pemberton, L. H.: **Reliability of deep-sea reversing thermometers.** *Discovery Reports*, London, Vol. 29:229–244, 1958. Review by J. H. Fraser in *Science Progress*, London, 47(185):148, Jan. 1959.

Krieger, F. J.: **Behind the sputniks.** Wash., D. C., Public Affairs Press, 1958. 380 p. 45 figs., bibliog. (37 p.) Price 48 sh. Collection of 39 articles and papers transl. from the Russian Based on work published originally as *Rand Research Memoranda RM*-1760 and *RM*-1922. Review by R. L. F. Boyd in *Science Progress*, London, 47(185):137–138, Jan. 1959. (*For abstract on RM*-1922, *see* 9.5–56, May 1958, *MAB*)

Menzl, O.: **Die Temperaturverhältnisse von Eichstätt/Bayern** [Temperature variations at Eichstätt, Bavaria]. Eichstätt, Verlag der Eichstätter Studien, 1955. 78 p. figs., tables. Review by R. Schreyer in *Wetter und Leben*, Vienna, 10(5/7):104–105, 1958. (*See* 10.2–23, Feb. 1959, *MAB*)

Schroeder, W.: **Practical astronomy.** London, Wyman; N. Y., Philosophical Library, 1957. 206 p. Price $6.00. Review by Frances W. Wright in *Optical Society of America, Journal*, 49(1):106, Jan. 1959.

B. TRANSLATIONS AND RECENT MONOGRAPHS

TRANSLATIONS

Al'pert, Ia. L.: **State of the outer ionosphere.** (Transl. of original Russian, **Sostoianie vneshneĭ ionosfery,** in *Priroda*, Moscow, No. 6:86–87, June 1958. table, 3 foot-refs.) Transl. by E. R. Hope issued as *Canada. Defence Research Board, Translation* T-304-R, Sept. 1958, available DWB.

Ambartsumian, V. A. (ed.): **Theoretical astrophysics.** (Transl. of original Russian, **Teoreticheskaia astrofizika,** issued Moscow, Gosud. Izdat. Tekh.-Teoret. Lit-ry, 1952.) Transl. by J. B. Sykes issued London, Pergamon Press, 1958. 645 p. Price 135 sh. (Note: German transl. **Theoretische Astrophysik,** issued Berlin, VEB Deutscher Verlag der Wissenschaften, 1957.) (*For abstract on all three editions, see* 9.10–9, Oct. 1958, *MAB*)

Defant, Albert: **Ebb and flow: the tides of earth, air, and water.** (Transl. by A. J. Pomerans of original German, **Ebbe und Flut des Meeres, der Atmosphäre und der Erdfeste,** pub. Berlin,

Springer Verlag, 1953. 119 p. figs., tables) 121 p. 64 figs., 8 tables. Transl. available DWB (525.6 D31eE). (*For abstract on original German, see* 5.1–188, Jan. 1954, *MAB*)

Guilcher, André: **Coastal and submarine morphology.** (Transl. by B. W. Sparks and R. H. W. Kneese of original French, **Morphologie littorale et sous-marine,** issued Paris, 1954. 210 p.) 274 p. 8 plates, 40 figs. Price 30 sh. Transl. available DLC (GB451.G813)

Iatsunskiĭ, I. M.: **Effect of geophysical factors on satellite motion.** (Transl. of original Russian, **O vliianii geofizicheskikh faktorov na dvizhenie sputnika,** in *Uspekhi Fizicheskikh Nauk*, Moscow, 63(1):59–71, Sept. 1957. figs., refs., eqs.) Transl. issued in M.I.T. Lincoln Lab., **Collection of Soviet papers on earth satellites,** issued 1957; reissued 1958. p. 113–140. Transl. available DWB (629.1388 M414co)

Poloskov, S. M. and Mirtov, B. A.: **Study of the upper atmosphere by means of rockets at the Academy of Sciences, U.S.S.R.** (Transl. of original French, **L'étude de l'atmosphère supérieure à l'aide des fusées à l'Académie des Sciences, de l'U.R.S.S.** Photostat of separated pages from unidentified source available DWB) Transl. by E. B. Dorling issued in *British Interplanetary Society, Journal*, 16(2):95–100, April/June 1957. (*For abstract on translation, see* 10.3–39, March 1959, *MAB*)

Zaborshchikov, F. Ia. and Fediakina, N. I.: **Interrelations of aurora, radiowave propagation, magnetic and ionospheric disturbance.** (Transl. by E. R. Hope of original Russian, **O sviazi mezhdu poliarnymi siianiiami, rasprostraneniem radiovoln, magnitnymi i ionosfernymi vozmushcheniiami,** in *Problemy Arktiki*, Leningrad, No. 2:149–159, 1957. Transl. issued as *Canada. Defence Research Board, Translation*, 288-R, 1958. 19 p. Transl. available DWB (M94.5 Z12in)

RECENT MONOGRAPHS

Eckert, E. R. G.: **Heat and mass transfer, Pt. A, Heat conduction and Appendix of property values by Robert M. Drake, Jr.** 2d ed. of **Introduction to the transfer of heat and mass.** N. Y., McGraw-Hill, 1959. 530 p. figs., tables, foot-refs., bibliogs. throughout, eqs.

Fluor Products Company, Los Angeles, Calif.: **Evaluated weather data for cooling equipment design.** Los Angeles, 1958. 82 p. figs., tables.

Kuettner, Joachim: **The rotor flow in the lee of mountains.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes* No. 6, Jan. 1959. 20 p. figs., refs., eqs.

Mises, Richard von: **Mathematical theory of compressible fluid flow.** Completed by Hilda Geiringer and G. S. S. Ludford. N. Y., Academic Press, 1958. 514 p. figs., tables, bibliog., eqs.

Nanney, C. A.: **Evidence for correlations between microseisms and earthquakes.** *U. S. Naval Research Laboratory, Washington, D. C., NRL Report* 5237, Jan. 13, 1959. 21 p. figs., tables, refs.

Rigby, Malcolm: **Review of major Russian works in various fields of meteorology, hydrology, and oceanography.** Wash., D. C., March 1959. 17 p. 14 subject groups, with titles alphabetically by author. Chronological listing of titles in Appendix II.

United Nations Educational, Scientific and Cultural Organization: **Problems of humid tropical regions.** Issued Paris, Unesco, 1958. 102 p. figs., tables, bibliogs. (722 refs.), map. Available DWB (574.9 U581pr) Review by L. Dudley Stamp in *Nature*, London, 181 (4620):1380, May 17 1958.

U. S. Robert A. Taft Sanitary Engineering Center, Cincinnati: **Air pollution measurements of the national air sampling network: analysis of suspended particulate samples collected 1953—1957** Cincinnati, Ohio, 1958. 259 p. figs., numerous tables, refs.

World Meteorological Organization. Regional Association VI [Europe]: **Resolutions and recommendations adopted by RA VI following the meeting of the Working Group on meteorological transmissions, April 1957 [and] during the extra-session of RA VI, Feb./March 1958.** *World Meteorological Organization, WMO [Publication]*, No. 80. RP.33, 1958. 57 p. Mimeog.

C. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

American Geophysical Union, Transactions, Vol. 40, No. 2, June 1959

Malone, Thomas F.: **A National Institute for Atmospheric Research,** p. 95–111

Chapman, Sydney: **The International Geophysical Year,** p. 112–119

Shrock, Robert R.: **Earth Science Center at Massachusetts Institute of Technology,** p. 120–12

Contents of Bulletin (Izvestiya), Academy of Sciences, U.S.S.R. Geophysics Series, October December, 1957, p. 124–125

American Meteorological Society, Bulletin, Vol. 40, No. 8, Aug. 1959

Crow, Loren W.: **What are some of the economic possibilities for the younger meteorologist?,** p. 389–393

Baum, Werner A. and Thompson, Philip D.: **Long-range weather forecasting in the Soviet Union,** p. 394–409

Jordan, C. L.: **An instance of reported winds of 200 knots in the lower troposphere,** p. 410–415

Arakawa, Hidetoshi: **Hydroelectric power generation and the climate of Japan: a case of engineering meteorology,** p. 416–421

Tenebaum, Oscar: **[Obituary of] Ivan R. Tannehill,** p. 431

Annali di Geofisica, Rome, Vol. 11, No. 3/4, July/Oct. 1958

Lehmann, I.: **On amplitudes of *P* near the shadow zone,** p. 153–156

Sponheuer, W.: **Die Tiefen der Erdbebenherde in Deutschland auf Grund makroseismischer Berechnungen,** [Depths of earthquake centers in Germany according to macroseismic computations], p. 157–167

Belluigi, A.: **Aspetti diversi applicativi dell'elettrogeosmosi transitoria,** [Various applications of transitory geoelectric osmosis], p. 169–190

Caloi, P. and Spadea, M. C.: **Le sesse del Lago di Como, Pt. 1,** [Seiches of Lake Como, Pt. 1], p. 191–198

Crea, A.: **Su alcune disposizioni elettrodiche interessanti processi elettrocinetici in terreni saturi d'acqua,** [Some arrangements of electrodes for the study of electrokinetic processes in water-saturated soil, p. 199–205

Contini, C.; Maino, C. and Ranucci, M.: **Nuovi criteri per la prospezione sismica a rifrazione,** [New criteria for seismic refraction prospecting], p. 207–232

Cassinis, R.: **Un criterio pratico di trasformazione fra diagrammi di resistività apparente ottenuti con differenti dispositivi,** [A practical method for the reduction of apparent resistivity diagrams obtained with different instruments], p. 233–236

De Panfilis, M.: **Note sopra un breve periodo sismico svoltosi nel territorio di Montespertoli durante il mese di giugno 1958,** [Note on a short seismic period which took place near Montespertoli in June 1958], p. 237–240

Di Noi, Alfonso: **Sul significato della presenza di metano nelle manifestazioni esalative e idrotermali,** [On the significance of the presence of methane in exhalative and hydrothermal phenomena], p. 241–247

Caloi, Pietro: **La crosta terrestre, dagli Appennini all'Atlantico, ricostruita sulla base dei rilievi sismici,** [The earth's crust from the Apennines to the Atlantic, as determined on the basis of seismic soundings], p. 249–264

Vol. 12, No. 1, Jan./March 1959

Caloi, Pietro: **Termologia del lago di Bracciano: onde interne,** [Thermology of Lake Bracciano: internal waves], p. 1–19

De Panfilis, M.: **Attività sismica in Italia dal 1953 al 1957,** [Seismic activity in Italy, 1953-1957], p. 21–148

Astrophysical Journal, Chicago, Vol. 129, No. 3, May 1959

Plumpton, C.: **The propagation of hydromagnetic waves of finite amplitude in a horizontally stratified atmosphere,** p. 752–757

Bazer, J. and Ericson, W. B.: **Hydromagnetic shocks,** p. 758–785

Warwick, C. and Wood, M.: **A study of limb flares and associated events,** p. 801–811

Rubin, Vera C.: **Solar limb darkening determined from eclipse observations,** p. 812–825

Baker, Robert M. L., Jr.: **The transitional aerodynamic drag of meteorites,** p. 826–841

Urey, H. C.; Elsasser, W. M. and Rochester, M. G.: **Note on the internal structure of the moon,** p. 842–848

Burbidge, G. R.: **Estimates of the total energy in particles and magnetic field in the non-thermal radio sources,** p. 849–852

Beiträge zur Physik der Atmosphäre, Frankfurt a.M., Vol. 32, No. 1/2, 1959

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★**Angewandte Meteorologie,** [Potsdam].
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★**Australian Meteorological Magazine,** [Melbourne].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
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★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
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★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologiia i Gidrologiia,** [Leningrad].
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